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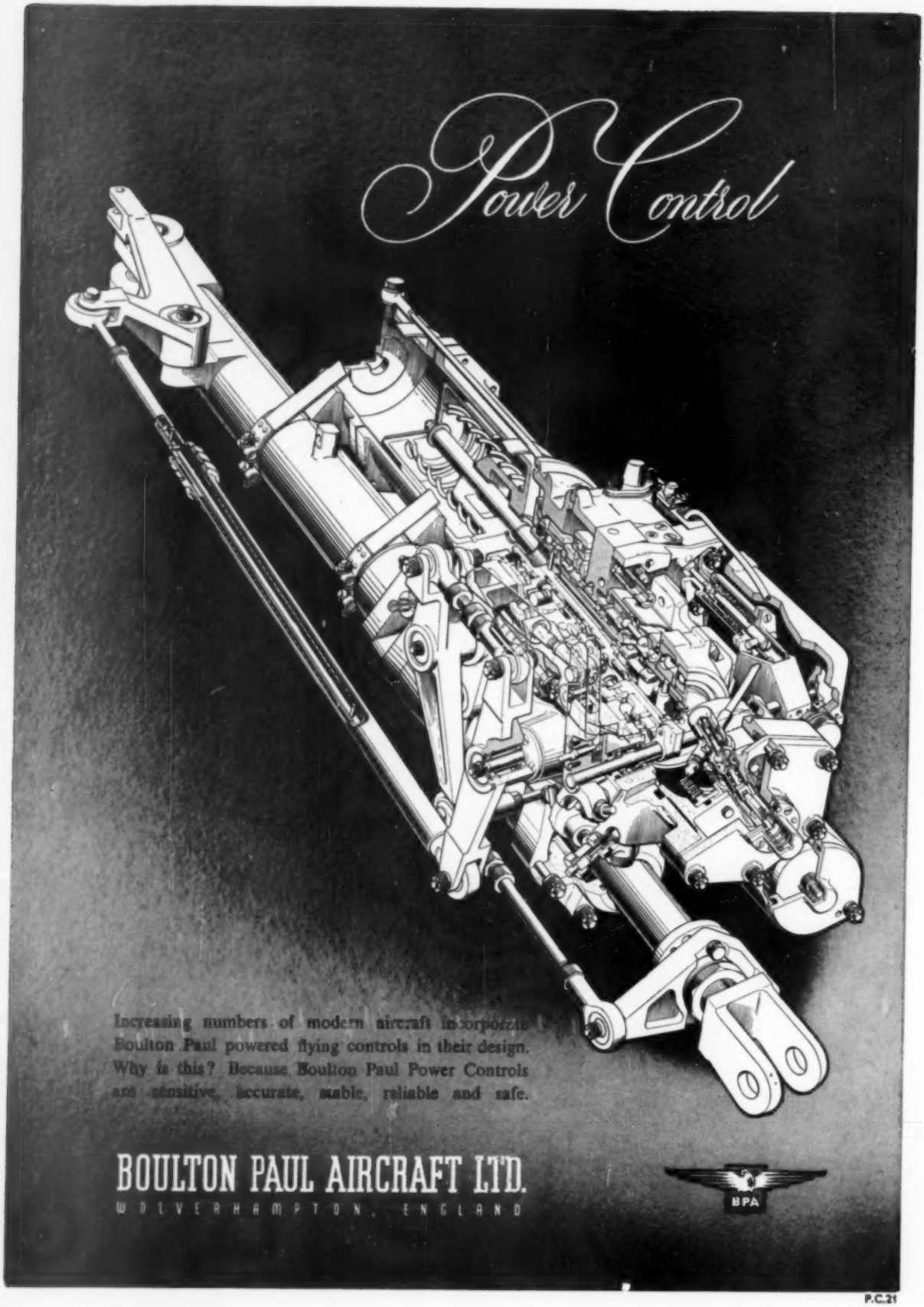
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Home and Foreign News

"FIRST FAMILY" OF THE JET WORLD...

From engines of tremendous power to a smaller new one of 2900 pounds-thrust, the world's "first family" of jet power plants bears the name of Pratt & Whitney Aircraft.

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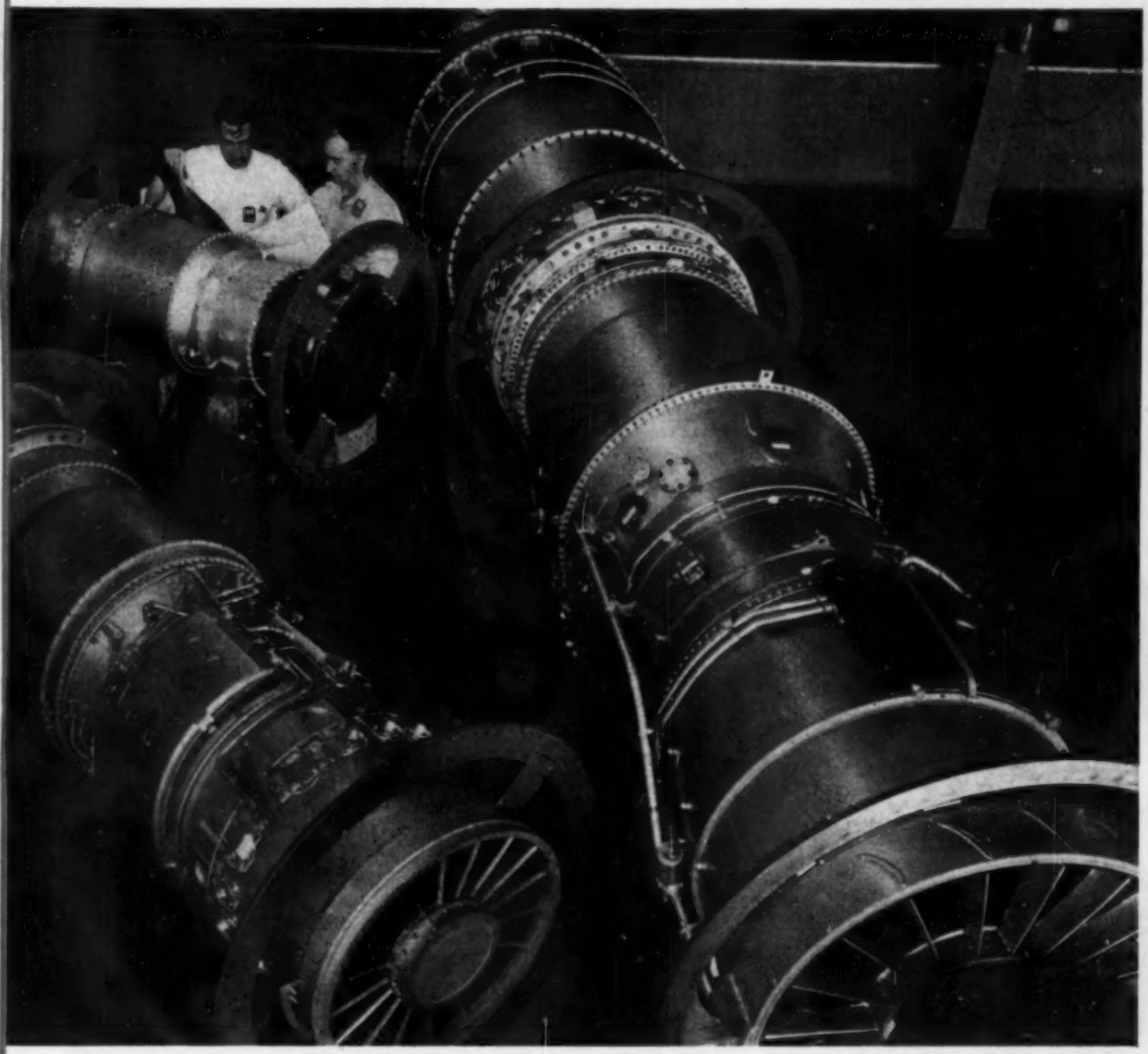
The smaller twin-spool J-52, whose commercial version is the JT8, is in the medium power range. This 7500 pound-thrust engine is slated to power a new missile, and a new twin-engined attack fighter.

Smallest and newest is the JT12, a simply-built,



rugged, efficient engine that reflects Pratt & Whitney's extensive engine-building experience. The JT12 weighs only 430 pounds, yet due to its advanced design it produces 2900 pounds of dry static thrust. With a single spool and fixed geometry, the JT12 promises outstanding performance, reliability and ease of maintenance for many possible applications.

Meanwhile at Pratt & Whitney Aircraft's research and development centers in Connecticut and Florida development continues on the powerful new J-58 engine, and various aircraft propulsion systems of the future are being explored or developed. When the time comes, they will be ready to take their places as working members of the world's "first family" of power plants for flight.

"FIRST FAMILY" of the jet world now includes four axial-flow jet engines, all pictured here. At left, the famous J-57; with afterburner it develops over 15,000 pounds-thrust. The commercial version (without afterburner) is the JT3. At far right is the big J-75 with afterburner, which produces over 20,000 pounds-thrust. Commercial version (without afterburner) is the JT4. Bottom center is the 7500 pound-thrust J-52. Behind it is the new JT12, appearing almost tiny besides its powerful big brothers.

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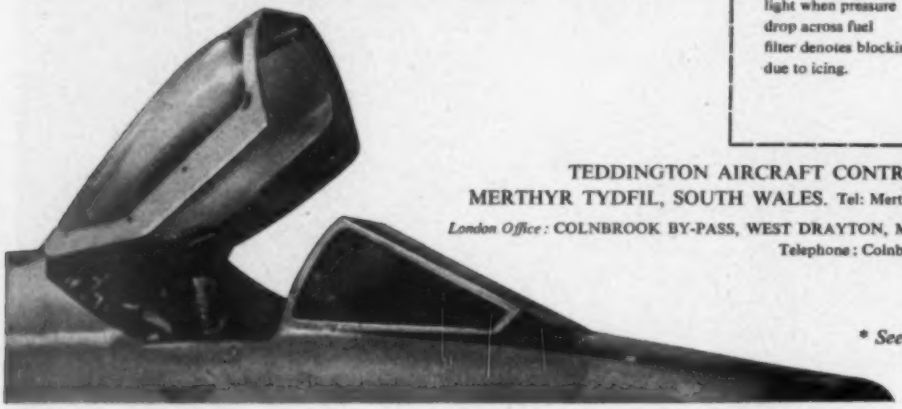

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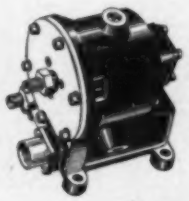

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* *See page 24 for answer.*

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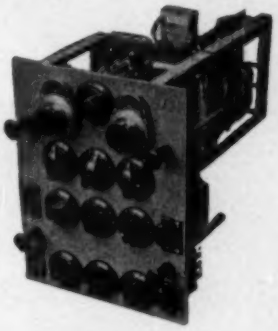

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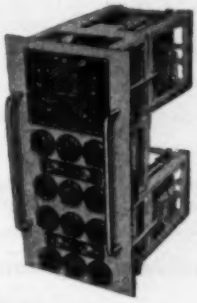

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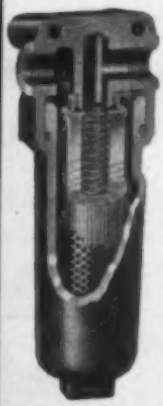

On the right is shown part of the pleated paper 'Micronic' element

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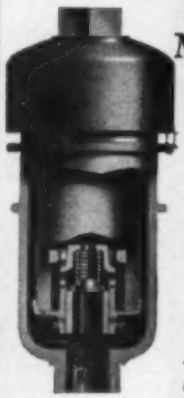
'Micronic' filters

can be supplied for all aircraft applications. Filtration —from 5 microns upwards— can be provided according to requirements. A standard range of high and low pressure models is available and new designs can be prepared when necessary.



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To the left of the filter is shown a portion of the metal-edge filter element, unwound to show construction

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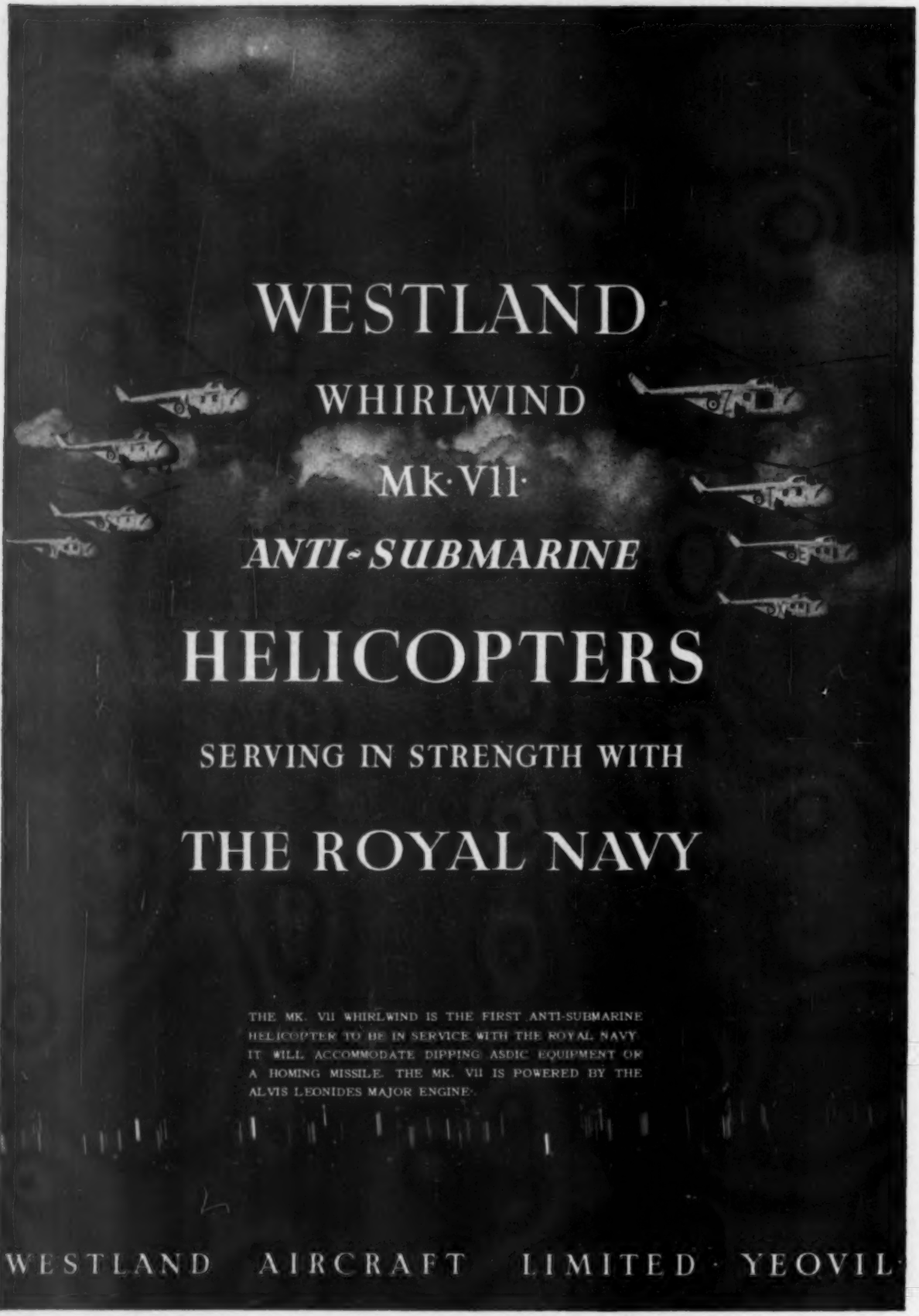
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FIRST AERONAUTICAL WEEKLY IN THE WORLD FOUNDED 1909

FLIGHT
and
AIRCRAFT ENGINEER

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Reviewing the Rotodyne

AS autumn matures, the lectures descend upon us like falling leaves—sere and yellow sometimes; more frequently golden with wisdom. Of those before us, that by Dr. G. S. Hislop on the Fairey Rotodyne is seen as an especially valuable contribution to knowledge—as, indeed, any detailed analysis of the design philosophy, technical characteristics, proving and possible future development of any important aircraft can hardly fail to be.

In respect of the Rotodyne (for it is of unorthodox design and unique in the world) many questions have been asked and many no doubt remain to be asked. But one of special importance was firmly answered by Dr. Hislop the other evening. It was the familiar one that runs: "How much better does the Rotodyne promise to be than, say, a highly developed helicopter of the conventional sort?" The lecturer's reply was that the Fairey company believe that cruising speeds of 220 knots (250 m.p.h.) are possible with the Rotodyne's basic configuration through developments aimed principally at maintenance of good control for the pilot and reduction of rotor drag. He mentioned also that a weight increase by a factor of 1½ could be contemplated with equanimity, and reference was made to one configuration with 65 seats. "In any case," Dr. Hislop added, "an economic VTOL aircraft, with adequate performance standards with an engine failed, *and* a cruising speed of 220 knots, with all weather capabilities is, I am certain, a vehicle which no operator, civil or military, scheduled or bush, can possibly afford to ignore." So no one can accuse Fairey of under-selling their aircraft.

There is one question, however, that still requires an answer, and it concerns the future financing of the Rotodyne programme. Dr. Hislop was characteristically fair when he told his audience: "We are indebted to the research and air branches of the Ministry of Supply for their technical and financial support of this venture, and we hope that this fruitful co-operation will continue." Until the time when Fairey are able to make as definite a statement in respect of Rotodyne finances as they have on its technical possibilities further comment on this pressing matter would be inappropriate.

Not Thinking of Aeroplanes

ALL the best adventures begin with a secret, and one of the most exciting secrets of late years is the British balloon *The Small World*, to which we first referred last week. "Exciting" we employ in the wholesome terms of Jules Verne, G. A. Henty and Percy F. Westerman, and not in the hectic, neurotic sense of current usage. It is a word that belongs with "secret" and "adventure" just as "valiant" belongs with "vigil" and "chivalry," or "mystery" with hansom-cabs and Baker Street.

Plainly our thoughts are far from costs per seat-mile or weapon-system concepts. We are being lured, not unwillingly, back into the brave romantic days by the prospect of a balloon—a secret balloon, yet one that has no political purpose, no military mission, and (except for the collection of some meteorological data) no *raison d'être* other than that of transporting three men and a girl into the realms of adventure. It is the story of Ulysses, Captain Joshua Slocum and *Kon Tiki*, in that while there is no suggestion of getting anywhere there is very definitely one of going somewhere. The spirit of the venture (for that is all there is to commend it) is conveyed in a conversation that passed the other day between a member of *Flight's* staff and one of the four balloonists. "When," enquired our man, "are you going to flight-test it?"

Balloonist: *Flight-test* it? You must be thinking of blankety *aeroplanes*. If we were to test it before the day anything might happen. Probably get caught up in a tree or something."

Brave *Small World*.

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FROM ALL QUARTERS

Moon Rocket Failure

THE third attempt by the U.S. Air Force to launch a "lunar probe" rocket from Cape Canaveral failed on November 8, when the third stage of the four-stage rocket failed to ignite. The rocket, named Pioneer 2, achieved a height of 1,000 miles and a speed of 16,000 m.p.h. before falling and burning up over East Central Africa. This was the final authorized attempt by the U.S.A.F. and the next U.S. lunar-probe firing will be made by the Army, using a Jupiter instead of a Thor as the first stage.

Touch-down and Conversion

THE Short SC.1 VTOL aircraft last week landed vertically on a football pitch adjacent to the Queen's Island factory and examination showed that the jet efflux from the four lifting engines had caused no damage beyond slight scorching of the grass. The manufacturers consider this to prove that the SC.1, and future VTOL airliners, will be able to land almost anywhere without harming the surface. They are now preparing for the next test phase, that of conversion from hovering to translational flight.

NA.39 Trials

FOR preliminary handling trials by Naval pilots the first prototype Blackburn NA.39 (two de Havilland Gyron Juniors) has been based for a short period at the Aeroplane and Armament Experimental Establishment, Boscombe Down. It is learned that the trials were completed satisfactorily, and the aircraft made thirteen flights in six flying days. This prototype has now been returned to Holme-on-Spalding Moor, where the third NA.39 —in regulation Naval colours as distinct from Blackburn "public relations" livery—is already flying.

Atlantic in Under Three Hours

IN the past few weeks there has been quite a spate of reports of high-speed Atlantic crossings by various jet airliners, V-bombers and other speedy aircraft.

One remarkable performance, achieved on October 11, has only lately been made public. An Avro Vulcan (four Bristol Olympus) of No. 617 Sqn., captained by S/L. R. Davenport on a "lone ranger" sortie, crossed from Goose Bay to its base at Waddington, Lincs, in 3 hr 53 min, at an average speed of 625 m.p.h. The coast-to-coast crossing (Cape Harrison, Labrador, to Northern Ireland) was achieved in 2 hr 59½ min, a speed of 649 m.p.h. This is believed to be the first Atlantic crossing in under three hours. The tail-wind component was not disclosed.

In another high-speed crossing, on November 4, an English Electric Canberra flew from Gander to Warton, Lancs, in 3 hr 48 min, averaging 585 m.p.h. for 2,210 miles. There was a 63 m.p.h. tail-wind. This was actually the first Canberra to be exported from Britain—in February 1953—to Venezuela, and it was now on the way back to its makers' works for major overhaul. The crew were John Hackett and Peter Moneypenny (navigator), both of English Electric.

A Canberra B.5 still holds the official record—605.52 m.p.h., in 1952—for the west-east crossing. That a similar aircraft after five years' service in South America can still approach that figure is a tribute both to its airframe and its two Rolls-Royce Avons.

SMALL TURBINES: Uppermost of these trim craft is the Beech 18 experimentally fitted by SFERMA with two Turboméca Bastan turboprops. Trials are under way at Bordeaux. The turbojet aircraft is the first Morane-Saulnier 760 Paris of l'Armée de l'Air. Lately tested at Cazaux, it has two 7.7 mm guns. Over twenty Paris have now been built

Noise at London Airport

IN the House of Commons on November 5 the Minister of Transport and Civil Aviation, Mr. Harold Watkinson, described the steps taken to limit the noise of the Boeing 707 at London Airport. To comply with his policy that jet airliners should "cause no more noise disturbance than the heavy piston-engined aircraft currently in use," the Boeing 707-120 must on take-off achieve a height of at least 1,000ft over the nearest built-up area, regardless of weather conditions. The precise conditions relating to the 707-120 would be modified in the light of experience. Other American aircraft and later versions of the Boeing would be the subjects of separate noise investigation.

Pan American Airways are now planning to start Boeing 707 services through London on November 17. A pilots' pay dispute will probably result in flights taking place on alternate days rather than on the daily basis originally planned. Daily services from New York to Paris and Rome started on October 26 and November 9 respectively.

U.S. Missiles for NATO

IT was announced in Washington recently that the U.S. Defense Department is agreeable to the distribution of the Sidewinder heat-homing air-to-air missile to any NATO country which desires to receive it. At the same time it was stated that certain American missiles have been cleared for manufacture in Europe; in particular, blueprints can be obtained of the Hawk surface-to-air weapon system designed to provide protection against low-flying aircraft.

Croydon in the House

REPLYING to a question by Mr. Frank Beswick in the House of Commons on November 5, the Minister of Transport and Civil Aviation, Mr. Harold Watkinson, said he saw no reason to alter the decision, which was taken in 1953, to close Croydon Airport. A "considerable extension of time" had been offered in the lease terms for Biggin Hill, and at Gatwick "we have made a change in the policy and have offered to develop there a base for executive and private flying." Col. C. F. H. Gough said that the "considerable extension" at Biggin Hill was, at the outside, an extension to seven years only, and was not acceptable to a large number of Croydon users.

Scottish Aviation Pioneering

NO fewer than 69 Twin Pioneers and 52 Prestwick Pioneers are now in service or are the subject of firm orders. The R.A.F. has now received 18 Twins and some have gone into service with No. 78 Sqn. in Aden, following exhaustive and very satisfactory tests with four machines at A. and A.E.E., Boscombe Down, earlier this year. Scottish Aviation are subjecting a complete Twin Pioneer to exhaustive fatigue tests in a large rig and have so far established a safe airframe life of 5,000 hr. The only fatigue failures have occurred in the testing frame.

The Royal Ceylon Air Force has taken delivery of a second pair of Twin Pioneers and the Royal Malayan Air Force has ordered four Prestwick Pioneers as well as Twins. Demonstration visits have been (or are being) made to Lebanon, Jordan, Sudan, Italy, Abadan, Mexico, Central America and the Caribbean. Sales representatives have also visited Switzerland, Malaya, Borneo, Hong Kong, Thailand, Ceylon, Japan, Philippines, Dutch New Guinea, Australia and New Zealand.

Demonstrations in Switzerland have brought swift results. It was announced last week that a Twin Pioneer has been ordered—for delivery next spring—on behalf of the Swiss survey authorities. The aircraft, states the Swiss announcement, "has proved to be the most suitable for survey operations in Switzerland at altitudes between 2,000 and 4,000 metres" (approximately 6,500ft-13,000ft).

Flight testing for A.R.B. and C.A.A. certification of the Twin Pioneer powered by Pratt and Whitney R-1340 engines is now getting under way. Five of these machines are on order for Philippine Air Lines.

10,000 SORTIES: Capt. J. B. Frewen, R.N., H.M.S. "Eagle," celebrating the 10,000th sortie of her commission, watched by Vice-Admiral A. N. C. Bingley, Flag Officer Aircraft Carriers, and Lts. Michael Forbes and (extreme right) Kenneth Reodings, the observers of Skyraider "417" of No. 849 Squadron which made the landing in the Eastern Mediterranean. Lt. Andrew Robinson was the pilot

Missing Mariner

AT the time of our going to press no trace has been reported of the Martin Mariner lost while flying from Lisbon to Madeira last Sunday afternoon. The aircraft was one of two operated by ARTOP (Aero Topografica), the newly formed company which took over the Lisbon - Madeira service from Aquila Airways at the beginning of October.

The Mariner left Lisbon just after noon with 30 passengers (including five Britons) and a crew of six. It was piloted by Capt. H. F. Broadbent (who, in 1938, flew a Vega Gull from Darwin to Lympne in the record time of 5 days 4 hr 21 min) and the co-pilot was Capt. T. Rowell. About an hour after departure an emergency signal was received. Late that afternoon an American aircraft was understood to have reported seeing the Mariner and it was assumed that those on board were safe. The accuracy of this report was subsequently denied, and returning search aircraft confirmed that no signs of the missing aircraft were evident.

G. H. Handasyde, O.B.E.

BY the death of George Handasyde, at the age of 81, Britain and the world has lost one of the greatest pioneer aircraft designers. "Handy," as he was known to his friends, built his first aeroplane in 1908, in North London, and a year or so later joined forces with H. P. Martin (who was of German extraction) to found the firm of Martin and Handasyde—later contracted to Martinsyde—to build monoplanes at Brooklands. The Martinsyde monoplane, one of the most graceful aircraft of its day, flew well and achieved several record performances in the hands of famous racing pilots. Handy was the designer and Martin was the business and financial manager.

In 1914—at which period, incidentally, Sydney (now Sir Sydney) Camm was one of his apprentices—"Handy" started building a vast (for its day) monoplane with 200 h.p. Sunbeam engine. It was intended for an Atlantic attempt by Gustav Hamel, but the project was abandoned when Hamel lost his life in flying the Straits of Dover.

By the outbreak of the Kaiser's War Martinsyde had produced the S.1 Scout (80 h.p. Gnôme), soon known as the "Tinsyde," a delightful little biplane with four-wheel undercarriage, and many were ordered by the R.F.C. when war came. The firm then built a more commodious factory alongside the railway near Woking, and it can be seen to this day.

Handasyde's next was a bigger single-seater, with 120 h.p. Beardmore, followed by another with 160 h.p. Beardmore; this was nicknamed the Elephant by the R.F.C., and No. 27 Squadron and several others had them when the war ended in 1918.

By this time the Martinsyde F.4 Buzzard (300 h.p. Hispano-Suiza or 275 h.p. Rolls-Royce Falcon) was going into large-scale production. Of high performance, it was used by the R.A.F. Communications Wing during the Versailles Peace Conference, and W/C. Harold Primrose flew one from Kenley to Buc, near Paris, 215 miles, in 75 min. Martinsyde also produced the Falcon-engined F.6, smaller and faster, which "Handy" redesigned as the Semiquaver. Frank Courtney won the Aerial Derby with it in 1920 at 153.45 m.p.h. and Fred Raynham established a British speed record at something over 160 m.p.h.

In the early 1920s Martinsyde, Ltd., was closed down because of lack of Government orders and Handasyde started up on his own, building a commercial monoplane with a 350 h.p. Rolls-Royce Eagle. When Marcel Desoutter formed a company in the early 1930s to build the Dutch Koolhoven monoplane under licence "Handy" adapted the machine for the British market, and it was a considerable success. After that he joined the British Klemm company, to adapt the German monoplane of that name. The firm later became the British Aircraft Manufacturing Co., for whom Handasyde designed the Eagle and Double Eagle monoplane derivatives of the Klemm.

By the outbreak of the Second World War he was getting on in years and decided to retire to his native Scotland. G. D.

FOR THE R.A.F. AND R.C.A.F.: The Pyrene Mk VI airfield crash tender, built on an Alvis Salamander 6×6 chassis (240 b.h.p. Rolls-Royce engine). This tender has been supplied for use on R.A.F. and R.C.A.F. airfields. Output from the Pyrene foam equipment is 5,000 gal/min for two minutes, and is reinforced by a General Fire Appliance chlorobromomethane unit of 16 gal capacity. In our previous issue this impressive vehicle was erroneously attributed to G.F.A., who, as indicated, are contributors

IN BRIEF

Twelve Hawker Hunters are shortly to be delivered to the Jordanian Air Force under the U.S. military aid programme. Announcing this in Amman last week, the British and American embassies added that a small R.A.F. training mission would be arriving in the country soon. A group of Jordanian pilots has recently undergone training in Britain.

* * *

Mr. J. D. Crane, A.C.A., has been appointed company secretary of de Havilland Propellers, Ltd. He takes over these duties from Mr. A. S. Wheate, who remains financial director.

* * *

In the island of Texel a series of Dutch "Monus" rockets are being fired to boost aircraft scale models to supersonic speeds. The work is being done by the Amsterdam National Aviation Laboratory in conjunction with the Hollandse Signaalapparaten factory.

* * *

The fourth Convertible-aircraft Congress—a triennial event—will be held on December 16 at the Franklin Institute, 20th and the Parkway, Philadelphia. Details from the executive secretary, E. Burke Wilford, Convertible Aircraft Pioneers, 300 Linden Lane, Merion Station, Penn.

* * *

Space research was the subject of a Royal Society discussion due to be held in London on Wednesday and Thursday of this week. The purpose was to examine the scientific problems involved in interplanetary exploration and to review the stages already reached in investigations by satellites.

* * *

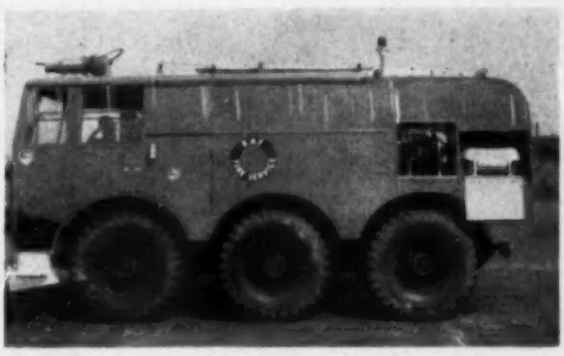
Seventy-year-old M. Lemercier, director of the Société Générale de Parachutes of Selles-sur-Cher, France, recently made a test jump, for the first time, with a new type of parachute of which he is the designer. The S.G.C. is an associate of Irving Air Chute of Great Britain, Ltd., and manufactures parachutes of Irvin design under licence.

* * *

Sud-Aviation have announced a "fast liaison and light transport" version of the S.E.117 Voltigeur. Powered by two Turboméca Bastans, it will have a pressurized cabin seating 8-10 passengers, and be flown by a crew of two. On the power of existing Bastans the S.E.118 Diplomate—as the newcomer will be known—will have a range-with-reserves of 2,000 km (1,243 st. miles) at 6,000 m (19,700ft) and 500 km/hr (310 m.p.h.).

* * *

Three special numbers of *The Motor Cycle* provide coverage of the current International Cycle and Motor Cycle Show at Earls Court, London: they are the guide, report and review numbers, published respectively on November 13, 20 and 27.



FROM ALL QUARTERS . . .

Lockheed VTOL Project

DESIGNATED CL-379, a VTOL project has been selected by Lockheed from more than 30 design-studies and submitted to the U.S. Army. It has been drawn up, state Lockheed, in response to an Army requirement for a research aircraft "combining tilt-wing and deflected-slipstream features with a lowered thrust-line and conventional propellers for maximum simplicity and performance."

The CL-379 specification provides for an empty weight of under 5,000 lb, span of less than 36ft, and power from two T53 Lycoming turboprops (960 s.h.p. maximum take-off power) driving three-bladed propellers.

Vertical lift, it is stated, will be achieved, "by a combination of tilting the wing by a simple hinged mechanism from its level flight position; extending wing flaps to deflect the slipstream downward; and placing the aircraft into a nose-up attitude (with the nosewheel well off the ground). This entire sequence will take place before the aircraft lifts off the ground."

Conventional cockpit controls, Lockheed add, will be used throughout the take-off, conversion and landing sequence.

For Speed, Efficiency and Economy

THE holding of the Electronic Computer Exhibition at Olympia, London, from November 28 to December 4, with nearly 50 firms exhibiting, underlines the rapidly increasing importance of the part which data-processing equipment now plays in industry.

Hitherto there has been no single source of information on the whole range of electronic computers and calculators, punched-card machinery, peripheral equipment and other such automatic aids to management and administration. Now, however, Associated Iliffe Press announce that the first issue of *Data Processing*, a new journal devoted to all aspects of the subject, is to appear in January.

In it, relevant equipment will be critically examined by experts and its use and newest applications described. The best of current operational practices will be analyzed and presented in a form enabling management and technical executives to apply it to their particular departmental problems.

Edited by P. J. Farmer, A.F.R.Ae.S., under the editorial directorship of A. B. Bourne, C.I.Mech.E., *Data Processing* will be published quarterly from Dorset House, Stamford Street, London, S.E.1. Price per issue will be 25s, with an annual subscription of £4 (U.S.A. and Canada, $12).

THE ROTODYNE REVIEWED

Dr. G. S. Hislop Addresses Joint Meeting of Helicopter Association and R.Ae.S.

A BROAD summary of the design philosophy, construction, flying procedures and test and development programme of the Fairey Rotodyne formed the subject of a lecture by G. S. Hislop, Ph.D., B.Sc.(Eng.), F.R.Ae.S., chief engineer (aircraft) of the Fairey Aviation Co., Ltd., on Friday, November 7. He was speaking at a London meeting organized jointly by the Helicopter Association of Great Britain and the Royal Aeronautical Society.

Much of the descriptive information in Dr. Hislop's paper has appeared in previous articles in *Flight*, in particular in the articles *Rotodyne* (August 9, 1957) and *Rotodyne Report* (December 20, 1957). Of particular interest in last week's lecture were the accounts of transitional flying techniques, flight progress to date and further developments (extracts from which are given below), and the illustrations reproduced on the opposite page.

Transitional Flying. "As apart from the Fairey Gyrodyne and the McDonnell XV-1 the transition regime lying between the helicopter and autogyro flight is fairly new, and one which arouses most interest in outsiders, it seems worthwhile to describe the process in a little detail.

"A stage-by-stage transition technique has been evolved to give complete handling safety at any point in flight, to allow the procedure to be followed during any normal flight condition without change in flight-path or noticeable change in attitude and to permit easy pilot training in the technique. The total sequence is completed in about half a minute in either direction.

"From the helicopter climbaway after take-off at 60-80 kt and 8 deg collective pitch, the aircraft is accelerated at the desired transition height (or in a gentle climb), by slowly increasing propeller pitch and at the same time slowly reducing rotor power, until at 110 kt and collective pitch 4 deg the tip jets are at idling power, and the propellers are providing practically all the forward thrust. The aircraft attitude is then about 2 deg nose-up.

"With two movements on a single lever on the pilot's console, fuel to the rotor is switched off and both auxiliary compressors are declutched. The rotor speed begins to fall slowly towards a steady autogyro setting, which at this low airspeed is not at all critical. The desired operating collective pitch of around 2½-3 deg is then selected and locked without reference to rotor speed. A small aft cyclic movement to maintain level flight (or climb) is quite automatic to the pilot, and the transition proper is complete. The fuselage attitude is now about 3-4 deg nose-up and passengers have had no impression of a changing flight state throughout the whole sequence.

"As the auxiliary compressors spin down, the aircraft is accelerated to the cruising airspeed, either through the manual propeller-pitch selection or, as soon as convenient, engine speed control is transferred to the normal propeller constant-speed governor as on any conventional propeller driven aircraft. In his own time the pilot then adjusts thrust by the throttle lever and elevator trim settings for the desired cruising air and rotor speeds.

"In drill sequence, the transition to helicopter flight is essentially the reverse of that to autogyro flight. Firstly, the engines are brought under constant-speed throttle governor control in cruising flight, and the airspeed is reduced to about 110 kt.

"At minimum rotor power settings, clutches are selected 'In', and are fully engaged in 4 sec with the airspeed at about 100 kt. It is usual in test flying to light the jets immediately after clutch engagement and then reduce propeller pitch to zero for the approach to land. But tip-jet relighting is now often delayed until 200-300ft before touchdown with an airspeed of 80 kt or less. Hence the total tips-lit time at the end of a flight is only about 1 minute as development stands at the moment. On relight rotor r.p.m. increases gradually by about 10 r.p.m.

"Finally, collective pitch and power is applied for a normal helicopter type landing.

"Transitional flying is already both easy and safe. At any point in flight, immediate recovery of the previous condition is possible if for any reason the pilot wishes to revert and, should any system mechanism fail during the sequences, a standby or emergency system is available for each stage. As proof of the success of the method the Rotodyne has already made transitions to and from autogyro flight in instrument conditions at 300ft above the ground . . ."

"Flight" photograph

Review of Flight Progress. "The first flight took place at 8.45 a.m. on November 6, 1957, three flights (including a low-speed circuit of White Waltham aerodrome) being completed by noon on that day.

"In the opening phase of the flight test programme the principal aims were:—

(1) to assess the quality of the pilot's flying controls in the hover and at low speed, (2) to check the functioning of the powerplant and its control system, (3) to maintain a close check on the stress levels in the main parts of the rotor system, and (4) to extend gradually the speed/height envelope.

"All this initial flying was confined to the helicopter regime until an indicated speed of 136 kt and an altitude of 6,800ft had been attained. The flying controls proved eminently satisfactory, particularly those of the rotor, an adequate degree of directional control being achieved by the differential propeller pitch scheme.

"Aerodynamic investigation had shown that the optimum speed for transition, based on a combination of performance and control factors, was likely to be around 100 kt, and thus sufficient speed margin above this was cleared for helicopter height. On the Boscombe Down rig development tests had proved, within the rig limits, that relighting of the tip-jets in the air could be relied upon from either of the duplicated tip-jet ignition systems.

"The stage was now set in which to begin the transition work. We were fortunate in that several hundred transitions had already been accomplished on the Jet Gyrodyne and thus the principles of the powerplant control during the process were well understood. The lifting wing, however, introduced a very important new feature which was thoroughly studied by the aerodynamic staff using theory and model tests. We decided to follow a gradual approach, reducing the maximum rotor power in discreet steps from the "all four jets lit" condition by extinguishing each pair of jets in turn, then declutching each half-rotor in turn, until finally no tip power was transmitted to the rotor. This phase threw up some further problems of relighting, and compressor air blow-off valves were introduced to facilitate the process at the higher altitudes where these initial transition tests were conducted. These blow-off valves showed to advantage in allowing a more rapid rate of descent than had hitherto been possible. This step-by-step approach allowed the pilots to assess the trim problems involved at each stage, until on the 71st flight on April 10, 1958, after a total of 20 hours' flying, the first full transitions were completed.

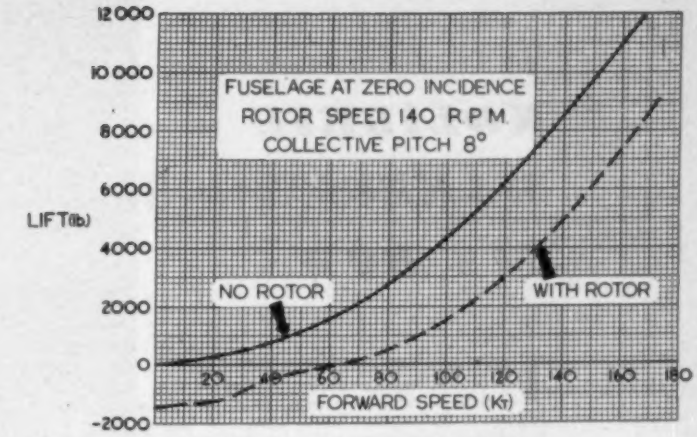
"Once the autogyro regime had been reached, more and more time was spent in this condition, extending the speed and height range, assessing the aircraft's flying characteristics and control qualities, and always keeping a careful watch on hub and blade stresses as well as on the powerplant and its control. The transition technique has been steadily perfected and now this is often conducted at very low altitudes and very shortly after take-off or before landing. The cruise speed of 160 kt on which the economics have been based has been exceeded, even at this relatively early development stage, at a power inside the cruise power rating of the engine, thus demonstrating beyond all shadow of doubt the soundness of the basic approach. The tip speed ratio so far reached in cruise is about 0.53, though ratios exceeding 0.6 have been attained. The climb performance is phenomenal for such a large aircraft as vertical rates of climb of over 1,900ft/min and forward rates of climb of over 2,400ft/min have been measured at full gross weight appropriate to the present engine ratings. I might emphasise here that virtually all flights have been done at full design take-off weight appropriate to these engines (the all-up weight was originally fixed as that at which 200ft/min rate of climb on one engine at one-hour power rating could be maintained) or slightly above.

"It would be wrong of me to suggest that no problems have shown themselves, and in any case no-one would believe me. I can say though that few, if any, serious problems have asserted themselves within the speed range originally fixed when design began about five years ago. The aircraft manœuvrability is very impressive for such a large, heavy aircraft, turns of 60 deg bank having been done in the course of such handling tests as we have covered to date. At the high speeds which have been attained, there is evidence of a reduction in the rolling control and an increase in the sensitivity of the fore-and-aft control.

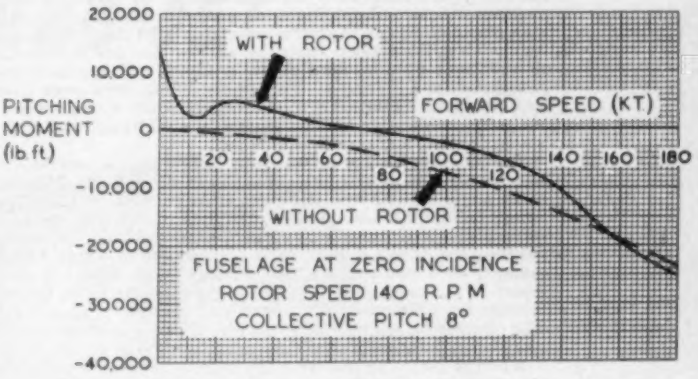
"The steps required to overcome these problems are clear to us and will be taken as soon as sufficient break in the flying programme offers itself. In the meantime, the emphasis will be on performance and handling assessment, especially in the engine-failed case which is of such vital importance to any civil air transport machine."

Further Development. "You may now ask what development possibilities there are with this configuration. Apart from increase in weight by a factor of 14, which can be contemplated with equanimity, we were especially concerned with exploiting the speed potential as much as possible. We believe that cruising speeds of 220 kt are possible with this basic configuration by developments mainly aimed at maintaining good control for the pilot and reducing rotor drag.

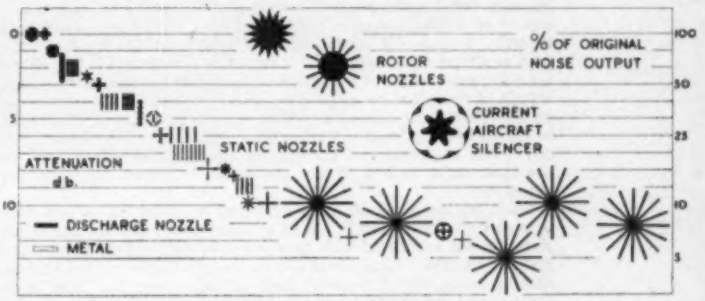
"At the moment, I would not care to say that higher speeds than 220 kt cruise could be achieved, though experience is a great teacher. In any case, an economic VTOL aircraft, with adequate performance standards with an engine failed, *and* a cruising speed of 220 kt, with all-weather capabilities is, I am certain, a vehicle which no operator, civil or military, scheduled or bush, can possibly afford to ignore."



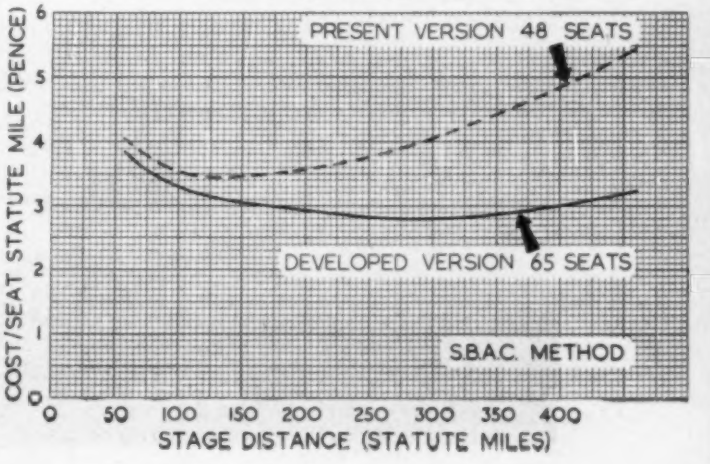
Typical wind-tunnel results for the Fairey Rotodyne: (above) airframe lift and (below) airframe pitching moment



Noise attenuation with various tip-jet silencers



Estimated direct operating costs for Rotodyne



KOLIBRIE MAKES ITS BOW

LAST Monday and Tuesday the Dutch N.H.I. Kolibrie ramjet helicopter was demonstrated at Ipswich Airport by European Helicopters, Ltd., who hold the import and distribution rights for the United Kingdom. The machine, registered PH-ACD, was ninth of the first batch of ten to be built. The company's chief test pilot, Rene van der Harten, gave a remarkable demonstration of its manœuvrability and control under all conditions, showing it to have greater agility than possessed by any helicopter so far seen in its class. A healthy, but low-frequency noise from the engines was not unpleasant, though loud. Price of the Kolibrie is £8,049 and operating cost is reckoned at £17/hr. All the demonstrations were made from a special flat trailer, towed by a Land-Rover, which would normally act as the on-the-spot base during agricultural flying, thus eliminating ferrying and positioning flying.

The Kolibrie has a gross weight of 1,434 lb and accommodates two people side-by-side, with dual controls. Four 22 Imp. gal tanks slung beneath the frame carry either fuel or spray, the former being either household or aviation kerosine. The stainless-steel spray-boom covers a 66ft swath and is flexible, thus greatly reducing the danger if an obstacle is encountered. Spray fluid is pumped by a two-stroke motor carried on the frame. Fuel is raised to the ramjets by a pump and centrifugal force, fuel-air mixture being automatically controlled according to air density. The diminutive, single-bladed tail rotor provides steering control, there being no residual torque.

When preparing to take off, a 50 c.c. autocycle engine under the tail-boom (or a flexible drive from an external engine) is started and engaged to drive the tail-rotor shaft by chain. When rotor speed reaches 60 r.p.m. the ramjets are lit. At 150 r.p.m. they become self-supporting and accelerate the rotor to 400 r.p.m. Power of both engines is controlled by the standard twist-grip throttle, though the fuel cocks may be regulated to achieve a flow at which combustion remains but power output is negligible. By this means van der Harten demonstrated the remarkably high inertia of the rotor by making a sharp flare-out after a precipitate power-off descent, zooming 50ft or so up without power from the hover and finally landing on the trailer accurately with one engine off. After alighting and completely switching off, he raised the machine some inches off the trailer for a period of about five seconds.

Each engine gives 60 e.h.p. and can be removed by one man in under a minute. After 150 hr of operation, pairs of engines are X-ray tested and fitted with new burners, matched on a test stand and re-installed. Total life is 450 hr, though 80 per cent of engines should reach 600 hr—some have already done so. The main rotor blades are made up of nose and trailing-edge extrusion with two spar and two skin sections, all Redux-bonded and reinforced with doublers at the roots. The blades are retained by sheaves of spring straps and supported on the ground by the transverse tubes which also control pitch. Gross-to-empty weight ratio of the Kolibrie is almost 3 : 1. Endurance is 50 min at the economic speed of 35 m.p.h.

Van der Harten pirouetted the machine so fast that fuel sloshed from a tank. He bounded astonishingly up from the trailer; toted a full 40 gal drum around; and seemed able to fly as fast backwards as forwards. He landed back on the moving trailer both sideways and forwards in a blustering wind. Starting took one or two minutes but appeared quite straightforward and the ramjets most willing to light.

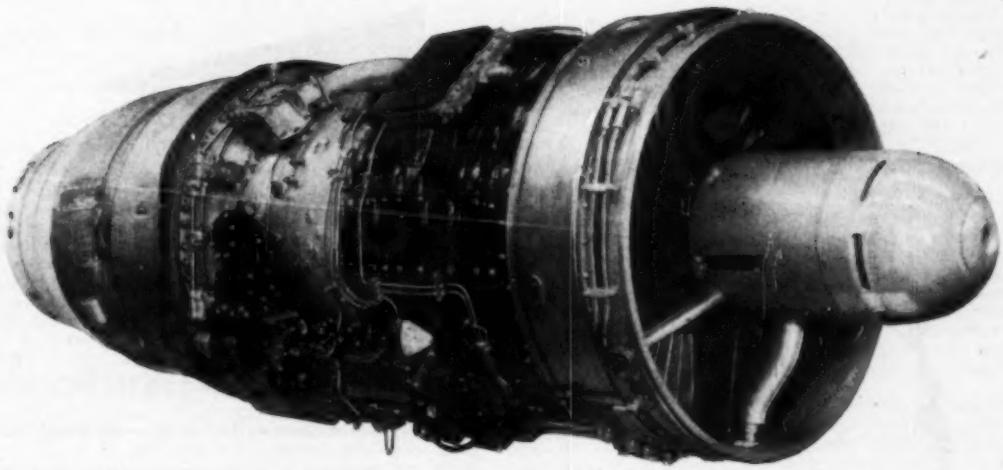
European Helicopters—whose headquarters are at Ipswich Airport—are interested in starting a contracting crop-spraying service in this country, and they consider that the Kolibrie should be ideally suited to the peculiarities of the British countryside. Many other applications for this light helicopter are also foreseen. A second batch of ten is now in production.

The Kolibrie, seen at top from "Flight's" Gemini over Ipswich, operated from its own small trailer (left) when spraying and carried a 40-gal drum (above). The small engine mounted on the skid drives the spray pump, while another, carried under the tail boom, starts the rotors

"Flight" photographs

POWER FOR SUPERSONIC AIRCRAFT

THE ROLLS-ROYCE AVON TURBO JET



Avons are in quantity production at a rating of 11,250 lb. dry thrust and are being developed to deliver considerably higher powers with and without reheat. They have flown more than 1,500,000 hours and are installed in fighters, bombers and transports including the Commonwealth Sabre, the de Havilland Comet 2 and Sea Vixen, the English Electric Canberra and Lightning, the Hawker Hunter, the S.A.A.B. Lansen and Draken, the Vickers Valiant and the Vickers Supermarine Scimitar.
Avons are in service with the armed forces of eleven countries and are built under licence in Australia, Belgium and Sweden.

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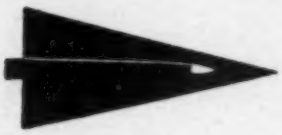
THUNDERBIRD AND ITS FUTURE



When even better guided weapons are needed, they, too will be THUNDERBIRDS

The English Electric Thunderbird is a highly effective weapon, but by no means the ultimate version of the weapon. Thunderbird as it exists today is built up from discrete sub-assemblies. It has been so designed in order that at any time any sub-assembly can be altered — within wide limits — to meet new and more strenuous service requirements. This built-in development potential ensures a continuing ability to meet more severe threats of attack.

'ENGLISH ELECTRIC'
THUNDERBIRD

THE ENGLISH ELECTRIC COMPANY LIMITED
Guided Weapons Division: LUTON · STEVENAGE · WOOMERA

A MEMBER OF THE ENGLISH ELECTRIC AVIATION GROUP

The Lockheed Electra is due to enter service in a fortnight's time—in the highly promotional colours of Eastern Air Lines. Services to Florida should begin out of New York on December 1

Electra Demonstration Flight

"FLIGHT" CLIMBS THE HIMALAYAS IN TWENTY MINUTES

By ALASTAIR PUGH

IF you had been reading or had kept your eyes closed it would have been difficult to know when the take-off started. There was none of that winding-up to full power characteristic of the piston engine, no straining against the brakes, no great change in noise level; just a subtle variation of note as blade pitch was increased, fuel was added by a single movement of the four power-levers, and the four Allison 501s accelerated up the scale by 3,800 r.p.m. to their constant-speed level. Only a gentle tilting of the floor indicated that—22 seconds after the roll began—99,000 lb of Lockheed's new Electra were airborne, slipping quietly and smoothly past 1,000ft of altitude every minute.

Since early October, when the demonstration Electra N7144C left California on its world tour, the quiet, unhurried process of becoming airborne has been completed more often than the Lockheed and Allison teams may care to remember. The Electra is visiting 32 cities in 29 countries, and although only about 50 hr had been flown between Burbank and Delhi, it seemed that "about a million and a half" people had seen over or flown in the Electra before the recent I.A.T.A. annual meeting at Delhi, where a chance occurred for me to sample it for myself. Previously, colleage Michael Ramsden, on his way to New York on a Comet training flight, had looked over this Electra at Keflavik, and a Dutch correspondent had written to *Flight* of a demonstration that was made at Amsterdam; so even before I saw it I felt I knew it pretty well.

The longest break in the Electra's tour—and partly the purpose of it—was at New Delhi, where a strong Lockheed team, headed by president Courtland S. Gross, was on hand to extol the virtues of America's first civil turboprop to the many I.A.T.A. delegates who had been invited to see and try it for themselves. Invitations to fly in the aircraft were issued in the form of a ticket. This was inscribed "World Premiere of Electra Flight" and contained blank boarding pass and cocktail party invitation forms from Lockheed and General Motors; these could be completed in any of the places that the Electra visited.

Armed with my invitation, I presented myself to a genial Dick Bean, of Lockheed's public relations department, at Palam Airport. For the benefit of Electra passengers an Indian-style marquee—flat roof and patterned red fabric—had been erected, principally (I imagine) for the very-V.I.P. passenger of the day before: Pandit Nehru, Prime Minister of India. Over coffee Dick Bean told me a little of the team's experiences since they left Burbank on October 5. On the way to Delhi, they had flown non-stop from Istanbul, and thought that their time of 7 hr 55 min might constitute a record. Flying airways, they had covered 3,220 miles and had arrived at Palam with 6,000 lb of fuel remaining in the tanks—sufficient, at best-range speed, for about another 400 miles. Dick introduced me to some of the Lockheed and Allison personnel on hand to answer questions, and then it was nearly time to take off.

All the Lockheed representatives—"Fish" Salmon and Frank Butorac, the pilots; Dick Bean; Glen Fischer, the flight engineer; Chuck Mercer, the cockpit commentator—wore grey flannels, blue ties and blue blazers, embroidered on the pocket of which was the now-familiar circular emblem to be seen on the Electra's fin: "Electra Flight—World Premiere."

Outside on the apron, the engines had already been started. The aircraft taxied over to where we were standing, the port engines were stopped and the airstairs uncoiled themselves from the forward door.

First impressions of the Lockheed-styled interior were that it was well suited to hot climates and sunshine; the predominant colours are white and blue—deep-blue flooring, deep-blue wall linings below window level, sea-blue chairs, and blue-and-gold curtains. It took a moment to appreciate that some seat covers were finished in another colour—a rather neutral gold-yellow, restful in the sunlight. The chairs, 66 of them in a typical low-density four-abreast layout, have sensible ashtrays and wide pockets in the back; in each is a plastic oxygen mask and tube for attachment to an overhead socket. At the back of the cabin, behind transparent half-bulkheads, is a lounge with bench seats for six; provided these seats are not sold they offer a sensible means of changing positions and stretching legs.

A particularly attractive feature of the cabin is the concealed lighting above the baggage racks; it leaves a clear and uncluttered roof-line. In the plane of the propeller discs on either side of the fuselage are toilets and galley stores racks; the curtained-off galley itself is situated on the port side immediately forward of the up-and-inward-opening door aft of the wing.

By the time that I had taken in these first impressions of the interior the Electra had reached 10,000ft. The noise level in the back of the cabin had remained uniformly very low during the whole ten minutes, although on walking forward I noticed an increase of noise and some vibration in the area adjacent to the toilets; surprisingly this persisted, with diminishing intensity, all the way forward to the flight deck. I judged the noise level in the toilet area to be equivalent to that of a Viscount in the same position relative to the inboard propellers; not a very good comparison, perhaps, because all Viscounts are by no means equal in this respect.

An extraordinary number of people—at least 12—had somehow squeezed themselves onto the flight deck. I quickly saw the reason why: we were heading directly for the Himalayas, which were now tantalizingly close, and still stretching well above us. The crew—Salmon in the left-hand seat, Butorac in the right and Fischer, jammed up against the console in the middle—didn't seem to mind the crush a bit and were taking pictures close against the windscreen panels with cameras handed forward by everyone who possessed one. "There's really nothing to do" was Salmon's comment, "engine r.p.m. are constant at 13,820 and all we have to do is to set the right power—directly read off those b.h.p. gauges—and climb at 210 kt I.A.S." Asked if he was not flying on the autopilot, he indicated to a girl who was taking photographs over his shoulder that she should try the control wheel. She did so—a sharp try, to which the Electra immediately responded.

By now I had reached the circuit-breaker panel against which Chuck Mercer was seated, microphone in hand, giving a running commentary on everything that was going on. From his vantage point I could study the flight deck. The layout is particularly good; even if it were not, the light grey background to all the instruments, the American light aircraft type of control wheels, the deep windscreen and "eyebrow" glazed panels would give that impression. The console between the pilots is very wide, and the overall width of the compartment not extravagant; but with seats that adjust up, down, sideways and in recline, accessibility is no great problem. There did not seem to be much room left for the engineer's legs, but Fischer said he didn't mind putting the seat back until he could stretch them out. On the forward part of the console, under the engineer's control, are the fuel cross-feed systems; cabin pressurization and oxygen systems are on the roof panel, and engine controls—the starting panel, including combined fuel and ignition electrical trip switches centrally placed above the screen, the fire-detector and warning-bell systems on the right, and single power-levers on the console below—may be reached by either the engineer or captain. In fact, the Electra could be ferried by one man.

(*Continued overleaf*)

". . . the very V.I.P. passenger, Pandit Nehru, Prime Minister of India." Of the Electra's cockpit, in which Mr. Nehru is here seen, the writer says: "The layout is particularly good; even if it were not . . . the deep windscreen and glazed panels would give that impression"

ELECTRA DEMONSTRATION FLIGHT . . .

At 20,000ft the climb was completed and, again without a change of engine note, blade angle was adjusted and fuel-flow reduced to give cruising power. Now very close, the Himalayas, awesome, jagged, magnificent in the sun, stretched ahead of us. Here and there, amazingly, peaks projected well above our cruising height. We turned left and then right, tracking along high over the snow-line before turning south for home. Immediately, while still above the higher foothills, Chuck Mercer announced an imminent demonstration and Glen Fischer reached up and flicked off the fuel/ignition switch of engine No. 1. Salmon allowed a little yaw to develop to demonstrate the gentle rate of swing and then easily corrected. Glen flicked No. 2 switch. Both engines were now developing negative torque and the yawing tendency had reached an easily held maximum. When the switches were cut, r.p.m. had immediately begun to run down. Now, after a few moments, they stabilized at a windmilling speed of 6,000 r.p.m. Negative torque sensed by the torque-measuring device tends to trip the feathering plunger, and would have done so had "auto-feathering" been selected, as it normally is for take-off. Instead an unstable condition is obtained in which the torque fluctuates as the feathering plunger is rocked a little way in and out by the torquemeter—the effect was apparent on the power gauges on the two port engines, which fluctuated between indications of minus 300 to minus 400 h.p.

Two feathering techniques were available, either of which could have been put into operation by any of the flight crew, all three of whom can reach the vital controls. By pushing the red "push to feather/pull to start" buttons immediately above the windscreen, the feathering sequence would have been performed electrically, the fully feathered propeller-blade position being achieved by electric pump. The alternative method is mechanical. By simply grasping and pulling the red "panic handles" on the instrument panel just under the central coaming, a complete shut-off sequence is performed—including fuel and ignition. I puzzled for some time as to where I had seen this type of handle and its square slide before: it was on one of those Machiavellian bagatelles with coloured lights in an amusement arcade.

When this method of feathering is used it may not be possible entirely to stop the propeller, since the feathering pump in this case is driven by propeller rotation and loses energy as its rotation slows.

On this occasion, the mechanical method was used, feathering being accomplished very quickly. The Electra was re-trimmed and then a third engine—No. 3—was first cut and then feathered. With high power on the only remaining engine (the limit being dictated by temperature) the Electra gently lost height. Mercer announced that engine starting would begin with No. 1; we should watch the rapidity with which the unfeathering took place and listen to the change in noise, and he would count off the seconds until cruising power was reached. It was about 13 sec in each case and was accomplished on the three engines in succession in little more than a minute—this with a flight deck still crammed with people.

Next I enquired whether the Electra's air-conditioning had been judged a success. Here is one of the most difficult design problems of all and a great many aeroplanes flying today are very poor in this respect—particular faults are too dry an atmosphere, or draughts, or condensation and fog. I knew that the Electra—which has a Freon refrigeration system, elaborate radiant-heating wall panels and a ventilation system where air is admitted from a long duct under the baggage racks and expelled at roof level—had been very carefully studied. My observation that this aeroplane was probably better than average (at least after only an hour) was supported by one of the engineers on board. He thought the system was now nearly right, although in the early days the most intensive static testing that Lockheed had ever done had not solved all the problems when the aircraft first flew. One early trouble, fog in the cabin, did seem to have been completely eliminated; appropriate conditions had frequently been encountered on this trip, but no fog had formed so far. Certain aspects of the response of the system regarded as a servo loop were still not entirely satisfactory, but on the whole, I was told, "it was probably at least as good as anything yet designed."

By this time we had descended considerably and were once again approaching Palam Airport at Delhi. Here began a demonstration that I venture to suggest will make the Electra an extremely popular aeroplane with the pilots who fly it. At circuit height, Fish Salmon announced that he would demonstrate acceleration; and he gently moved the power levers back and forth. The effect was startling, and the alternate acceleration and deceleration so powerful that it was necessary to brace both hands and legs in order to remain upright. What this does not convey is the extreme rapidity of response for so large an aeroplane, due to the constant-speed engines and the slipstream wash over the wings.

Dropping the undercarriage (with a little thud to be heard

(Continued on page 764)

Already the momentum of Electra production is such that more than 15 aircraft have been rolled out from Lockheed's Burbank factory. The traditionally modest markings of American Airlines—who will introduce their Electras before Christmas—compare strikingly with those of Eastern

France's Latest Anti-tank Weapon

THE NORD 5210 (S.S.11) DESCRIBED

By James Hay Stevens, A.F.R.Ae.S.

THE French S.S.11 (Nord Type 5210) is not just a replacement for the S.S.10; it is a complementary missile, being a "cavalry" weapon, while the S.S.10 is an "infantry" one. That is to say, whereas the earlier missile was primarily designed for deployment in the field in concealed batteries, with foot-soldiers bringing up rounds in individual containers, the S.S.11 is primarily intended for launching from armoured vehicles, trucks, aircraft, or small ships.

The S.S.11 should also be seen in perspective with the overall guided-weapon programme of Nord-Aviation S.N.C.A. The original S.S.10 was developed from an initial German idea, and with it the manufacturer—and the French Army—learned by hard experience that, while designing a missile is one thing, producing an operationally reliable weapon is quite another. The early vicissitudes (similar to those which eventually led to cancellation of the U.S. Army's Dart) have resulted in a most reliable weapon system—and a design team fully aware of the multitude of snags that surround G.W. "environmental" design. The S.S.10* is a wire-controlled weapon of low speed—about 180 m.p.h.—and with aerodynamic control by vibrating spoilers similar in principle to those of the CT-10 and CT-20 target drones.†

The next step was the Nord 5103 AAM, which has recently been adopted as a NATO air-to-surface missile for the Fiat G-91. This is a supersonic missile wherein the wire control system has been replaced by radio-command guidance, and aerodynamic control by jet deflection. The change in guidance was necessitated by the higher speeds of aeroplane and missile. The switch from aerodynamic to thrust control was desirable so that the missile's response would be relatively independent of flight conditions (particularly air density), and also because the drag of the spoilers would have been high and their shape incompatible with a high-speed aerofoil section.

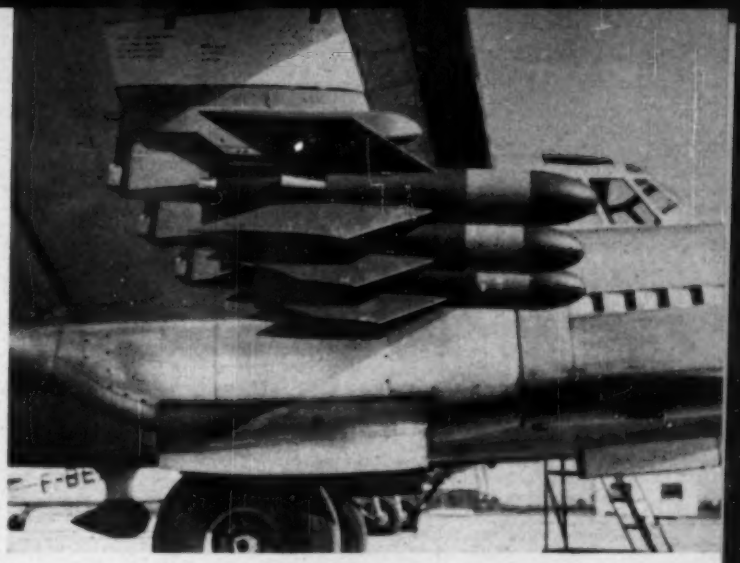
IT was recently confirmed ("Flight," October 24) that the Ministry of Supply has ordered a number of French Nord S.S.11 wire-guided anti-tank missiles for evaluation, and that trial firings against a variety of targets are to be made; for air launchings, the weapons will be fitted to Scottish Aviation Pioneers and Twin Pioneers. This article gives a detailed description of the S.S.11 and its operation.

The S.S.11 is a combination of the proven wire-guidance system and armour-piercing warhead of the S.S.10 with the tried jet control of the Nord 5103, of which many hundreds of rounds have been fired. It is of interest to note that, in addition to being a standard weapon of the French Army, the S.S.10 has been sold in quantity to eight countries and has been in production for some time at a rate of at least 500 a month—with licence production likely in several countries.

Description. Although internal details of the S.S.11 are "classified," much can be deduced from externally obvious features by bearing in mind that the weapon is largely based on the S.S.10. The bullet-shaped nose containing the warhead is screwed to the main body/wing unit in order to avoid the drag of the quick-release toggles of the slower missile. The cylindrical body to which the wings are attached carries the booster and sustainer rockets. Aft of the power unit is a cylindrical casing containing the control mechanisms, the firing connector, the two guide-wire bobbins and the trace flare for aiming. The "fuselage" structure is of light alloy and just about as simple as possible.

The cruciform wings are more refined aerodynamically than those of the S.S.10. Instead of a flat-plate aerofoil a symmetrical section, about 10 per cent thick, is used. The structure is probably a thin light-alloy sheet wrapped round a balsa-wood core and attachment-flanges, the whole joined by Redux bonding. Four pairs of cross-slot mushroom-headed screws are used to fix each wing to the body.

The wings are set at an angle of incidence to the body axis so that the missile rolls slowly in flight, thereby both neutralizing any asymmetry of manufacture and twisting the two enamel-insulated control wires so that they are strengthened. This cancellation of manufacturing errors eases working tolerances and can greatly reduce cost. A simple, robust Nord powder gyro is the basis of the stabilizing system which gives the jet interrupter (trembler) mechanism the reference planes by which to provide yawing and pitching moments. Like the spoilers of the S.S.10, the jet "interrupters" would have to work continuously, control being by superimposed signals which increase the dwell at one end of the stroke.



Battery of Nord S.S.11 wire-controlled missiles mounted under the wing of a Dassault Flamant, general-purpose aircraft

The booster motor is provided with a pair of lateral propelling nozzles, the splay angle of which is indicative of the location of the little aircraft's c.g. The sustainer nozzle lies on the axis of the missile and is prolonged to the extreme rear of the body, the direction of its thrust being modified by the jet-deflection system for flight control.

To obtain yaw/pitch moments on the rotating missile this system must have four jet spoilers in opposing pairs, and it is logical to assume actuation by four pairs of electro-magnets energized by a low current from dry batteries in the missile. Following the S.S.10 system, the current supplied by the dry batteries would be transmitted to the spoiler solenoids according to the signals transmitted by two relays, one for direction (yaw) and one for elevation (pitch), and by a distributor operating in conjunction with the powder gyro to compensate for the autorotation of the missile. The two relays and the gyro-distributor unit are almost certainly located inside the light-alloy cylindrical body, aft of the power unit.

The two guidance-wire spools (not rotating spools, but canisters in which the wire is coiled-down nautical fashion) protrude longitudinally from the sides of the rear body at 90 deg relative to the two booster nozzles and, of course, nearer the stern of the missile. Two aiming flares and the firing quick-release multi-pin plug are fitted on the rear cover, which has a central hole for the passage of the sustainer motor jet.

Aiming is by the same type of binocular sight as that for the S.S.10, the same power pack, signal generator and small joystick controller being used with it. Similarly, the synthetic trainers and aptitude tester developed for the earlier weapon are adaptable for the faster one. One would expect greater skill to be needed to achieve the 80 per cent accuracy which French infantrymen regularly show with the S.S.10, but Nord-Aviation claims that a similar standard has been recorded with the S.S.11.

Fabricated light-alloy zero-length launchers are used, the weapon being suspended by a U-fitting, or resting by its weight upon the rail. As an alternative, there is a metal transport/launcher case; where this is not used the S.S.11 is packed in a wooden box. In each instance the weapon is stowed with its warhead unclipped and its three-cell dry battery (which has a limited shelf-life) stored in a separate compartment in the preservation-case, so that it can be replaced when its date is due without disturbing the sealing of the main container.

It is a surprisingly simple weapon to launch and is, in fact, regularly fired simply by standing it on the rear tips of its fins and propping the nose up at the correct angle with a stick; a simple guide to hold the control wires is the only other requirement. The top of the wooden case has a hinged tubular prop and a wire guide for such a launch.

Associated equipment in the S.S.11 weapon system—much of it identical with that of the S.S.10—includes a transistorized fire-control check box for testing the whole function of the

**Fully described in "Flight" for February 7, 1958, page 169.*
†"Flight," May 18, 1956, page 637 (CT-10) and March 14, 1958, page 352 (CT-20).

FRANCE'S LATEST ANTI-TANK WEAPON . . .

guidance equipment, and a battery test unit for the dry cells in the missiles, or for those stored in the containers.

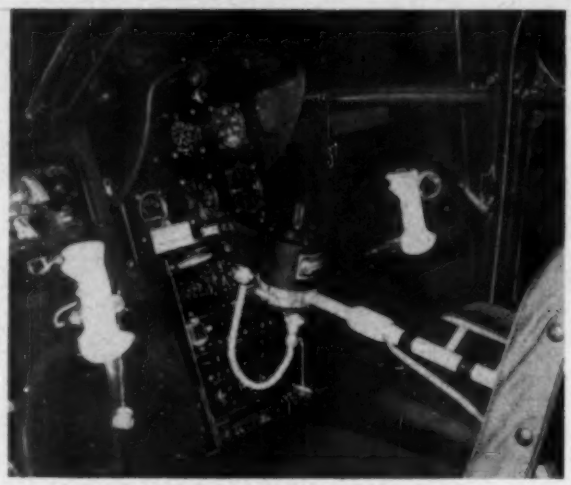
Firing: When the firing signal is given the powder gyro is started and the booster charge fires, through the two lateral venturi nozzles, to accelerate the missile to 330-360ft/sec in 1.4 sec. The sustainer ignites 0.7 sec after launching and continues to accelerate the missile, as its weight decreases, throughout its flight. Theoretically, the terminal velocity of 620ft/sec is reached at extreme range, rather more than two miles, after a flight of 23 sec. As the sustainer ignites, the missile comes under command guidance, but a safety gas-pressure lock prevents arming of the warhead fuse until 4 sec after launching.

Launching from an aeroplane is limited to a maximum speed of 250 m.p.h. because of control-wire strength limitations.

The lateral range is approximately 60 deg each side of the firing axis, the target being reached on a curved course. Instantaneous course deflections of 15-20 deg can also be made during the first two seconds of flight. The minimum effective range is 1,650ft.

The standard warhead, known as the 105 AC (*anti-char*), is a combination of shaped and fragmentation charge. It will penetrate 19.7in of perpendicular armour plate (50 tons/sq in tensile strength) and lesser thicknesses to oblique angles of the order of 70 deg. There are also an armour-piercing shaped charge, of which no performance details have been released, an alternative anti-personnel charge, and an inert warhead for training.

Utilization: The S.S.11 is a production weapon—something like 5,000 have been made in the last couple of years—and the French forces have several standard installations. Because the span of the swept wing is only two-thirds that of the S.S.10, even if the weight is almost double, more S.S.11s can generally be mounted on a given vehicle. Aeroplane installations include triple launchers under each wing of the Dassault Flamant and underwing mounting on the French Navy's Vought Corsairs. There is also a double paired mounting on a cross-bar on the Sud-Aviation Alouette and a curious installation for the Navy Sikorsky S-58. The four launching rails are mounted on port and starboard spreader bars, with the outer rails toed-out 20 deg.



The guidance-joystick for the Nord S.S.11, as installed in the cockpit of the Sud-Aviation Alouette helicopter

The airborne launcher is basically the same as the ground one, but with the addition of light fairings, and the round is always underslung. No details are yet available of the method of installation on the British aircraft referred to in the introductory note on page 763.

The S.S.11 is also being tried both as a coastal-defence missile, for it is easily hidden among rocks or scrub, and as an assault weapon from landing craft. NATO countries with long coastlines are said to be particularly interested in the S.S.11 as an anti-invasion weapon because it is so much easier to deploy and hide than guns of equivalent crippling capacity.

Nord-Aviation 5210 (S.S.11) Data

Missile.—Length, 42.5in; span, 18.7in; diameter, 6.5in; gross weight, 62 lb; warhead weight, 13 lb; max. speed, 425 m.p.h.; max. range, 11,500ft.

Launching Ramp.—Length, 33.4in; width, 20.4in; height, 14.1in; weight, 20 lb.

Transport Case/launcher.—Length, 35in; width, 17in; height, 23.2in; weight, 77 lb.

ELECTRA DEMONSTRATION FLIGHT (Continued from page 762)

from the nosewheel) and lowering the flaps on finals, Fish repeated the acceleration demonstration again, talking and explaining as he drove the Electra—the expression is deliberate, because the whole action seemed as positive as if it had been in two and not three dimensions—towards the end of the runway. Even allowing for this pilot's enormous experience and capability, it all looked wonderfully simple and straightforward, although I did wonder as I watched the amount of control being used whether slow-speed aileron effectiveness was all it might have been.

We were to make a landing on Palam's 7,400ft runway without using brakes or reverse pitch. As we touched down, Fish simply pulled the power levers back (to an accompanying "whaar" from the propellers) until four lights on the instrument panel indicated "Beta range." This is the condition where the power levers control pitch-angle directly, and so can be used to apply reverse thrust in a proportional manner.

I do not know the distance in which we stopped; but we still had plenty of runway in hand when we were ready to turn off and the deceleration from the blade drag was considerable; some of us had been standing during the landing and we were told that we should have been pitched forward if full reverse thrust had been applied.

It is, I think, extremely easy to get over-excited about a new type of aeroplane, simply because it is new and different. But here enthusiasm seems deserved, especially from the pilots who will spend their working hours on the superb flight-deck. Passenger enthusiasm will probably be tempered by the seat pitch used, but the air-conditioning seems much better than today's scheduled-service standard and the noise level—at least aft of the propeller discs—is extremely low. I sometimes wonder why Lockheed have made so many efforts to plug the Electra as some sort of a jet: "Jet-prop, jet-age flying, jet-age Electra facts," and so on. It isn't a pure jet, and it won't take passengers long to realize the fact. But it is, in its own right, a very good turboprop indeed.

"FLIGHT" INDEX

THE index to Vol. 73 (January-June, 1958) of *Flight* is now available, price 1s (by post 1s 3d), from Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Readers' own copies of this volume can be bound (with index) at a cost of 25s, postage included; or binding case and index are available separately, price 7s 6d (by post 9s). Copies for binding (with sender's name and address enclosed) should be forwarded to Iliffe and Sons, Ltd., Binding Dept., c/o 4/4a Iliffe Yard, London, S.E.17, and advice and remittance sent separately to the publishing department at Dorset House.

TEN YEARS' TOP-DRESSING

MORE than five million top-dressing flights have been made and over 20 million acres of hill country have been treated by aircraft in New Zealand during the last ten years. This was disclosed at a recent function held in Wellington to mark the tenth anniversary of the country's first aerial top-dressing operation.

Mr. D. A. Campbell, chairman of the Soil Conservation and Rivers Control Council Advisory Committee on Agricultural Aviation, told the meeting, "For versatility and intensity of application in proportion to the size of our primary industry, New Zealand leads the world in aerial farming." The growth of aircraft techniques in agriculture, he emphasized, was basic in a country where 70 per cent of the land was too steep to plough.

In the ten years under review, almost 3,000 tons of clover and grass seed, and 22,000 tons of rabbit poison had been distributed by aircraft. Over 9,000 tons of weed-killer chemicals had been dropped, in addition to almost 2,000 tons of fencing and other supplies.

GEOPHYSICAL SURVEY

AN airborne magnetometer survey of the north Midlands and part of the Irish Sea has been completed by Canadian Aero Service, Ltd., for the Geological Survey and Museum, South Kensington. For the third time on such work Canadian Aero used Anson G-AMDA (operated by Derby Aviation), flying a total of 13,750 line miles, including 2,000 miles over the Irish Sea, and based for the survey at Derby and Blackpool.

Instruments used included a Gulf magnetometer and a Canadian Aero Aeropath continuous-strip camera. For navigation over the Irish Sea the Decca Navigator system was used. Geomagnetic maps are being prepared from the data obtained during the survey, and will be delivered to the Geological Survey this month. Another survey recently completed by the Canadian company, for the Directorate of Overseas Geological Surveys, was in Sierra Leone.

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4. ***Eight 25-pound bombs and four 60-pound rockets .. OR***
5. ***Eight 25-pound bombs and eight 3-inch rockets.***

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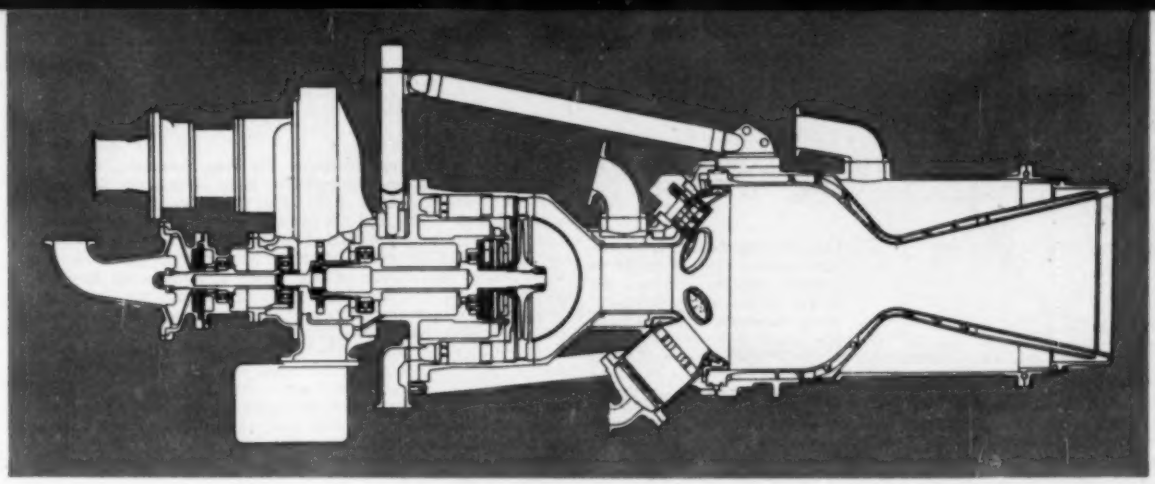


Development of the Spectre

POINTS FROM AN INFORMATIVE PAPER BY A DE HAVILLAND ENGINEER

ON November 4 a lecture was read before the Royal Aeronautical Society by Mr. Wilfred N. Neat, B.A., A.F.R.Ae.S., the chief engineer of the rocket division of the de Havilland Engine Company. After extensively reviewing the twelve-year history of his company in the field of rocket propulsion, Mr. Neat turned to the main theme of his paper—the Spectre, which is undoubtedly one of the most versatile and controllable rocket engines yet produced anywhere.

Although the propellants were fairly soon chosen as high-test peroxide (H.T.P.) and kerosine, there was, said Mr. Neat, no unanimity within the aircraft industry regarding the size of engine needed. Recommendations ranged from 2,000 to 15,000 lb sea-level thrust, and it was finally agreed to design for 8,000 lb with a possible later rating of 10,000. It was also decided that the Spectre should initially be capable of throttling to about 20 per cent of its full-thrust rating, with development later to a still lower ratio.

Rig testing began in 1952, and the first version of the engine is illustrated above. The stainless-steel chamber was made quite separate from the surrounding light-alloy jacket. Fuel was injected through three banks of injectors each containing fifteen swirl nozzles brought into action progressively by movement of the throttle. Roughly half the H.T.P. flow was passed through the turbine, which was a single-stage impulse wheel running up to 13,000 r.p.m. Control was provided by a servo governing the H.T.P. feed to the turbine and intended to maintain constant r.p.m. even in extreme conditions such as cessation of fuel supply. Special attention was paid to sealing the turbine shaft, and this was effected by a combination of labyrinths and a carbon ring.

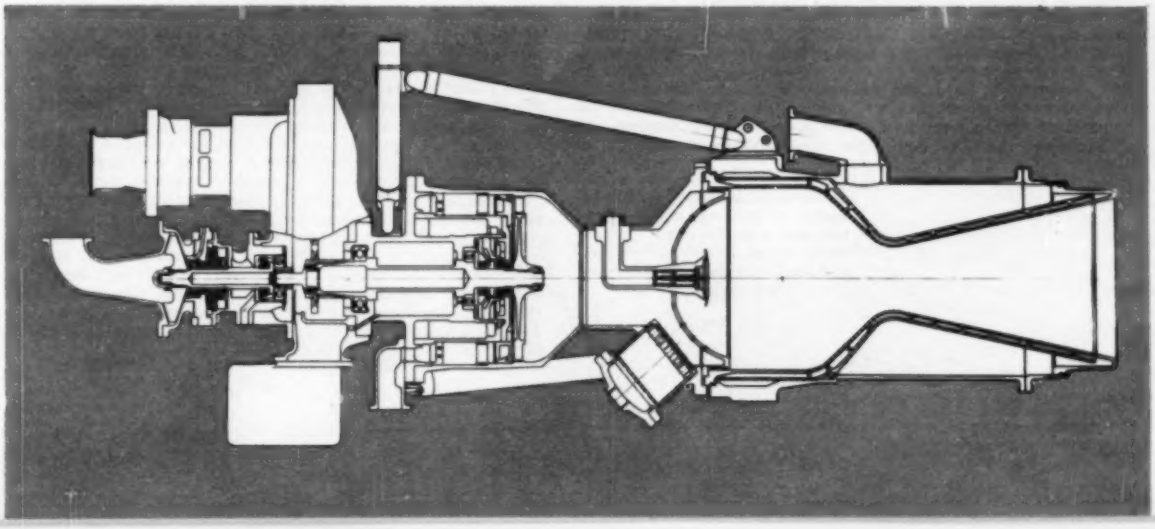
Sections of Mr. Neat's paper discussed the basic rig-testing of the Spectre DSpe.1, and the development of the starting system and turbine seal. The complete unit was run "cold" in the middle of 1953, and the following autumn hot runs were being carried out, the combustion temperature initially being restricted to 1,700 deg C by the use of a 16 : 1 mixture ratio. Stoichiometric and full-thrust conditions were achieved about six months later, and a considerable amount of running between 1,000 and 9,000 lb thrust was soon being achieved very easily. A diagram overleaf gives an indication of the manner in which running time built up on complete engines, and a vast amount of rig testing and laboratory development took place concurrently. By the autumn of 1956 the DSpe.1 had been cleared for flight, and its form at this stage is shown below.

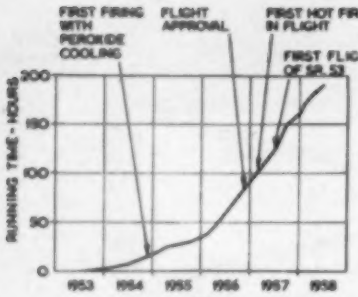
A major advance was the elimination of the governor. It was also found that good handling at low thrusts could be achieved without staging the fuel injectors, and the multiple banks of injectors originally fitted were replaced by a single poppet injector, in which a non-return valve—which had been rendered necessary by frequent blow-backs—could be incorporated. Kerosine fuel was led into the combustion chamber through a mushroom-type injector, which protruded from a central hole in a steam distributor plate (looking like a domestic colander) and contained numerous radial holes to spray the kerosine on to a target plate. At this stage an explosion was caused through mixing of the H.T.P. and oil in the H.T.P. pump, and to prevent a recurrence of such trouble it was decided to vent open spaces between the two portions of the pump and to lubricate the bearing nearest to the impeller with H.T.P., an unplasticized p.v.c.-rod bearing being developed for this purpose.

In November 1956 this form of DSpe.1 was cleared for flight between 2,000 and 7,000 lb sea-level rating, and flight trials began the following month using a Canberra test bed. When hot runs were started with the installed engine, the airframe and equipment to the rear of the Spectre began to break down under the intense impingement of ultrasonic noise. Various methods overcame the trouble, and as it was particularly acute during ground running the latter was carried out only with a protective insulating muff attached to the underside of the rear fuselage.

When the Saunders Roe SR.53 supersonic mixed-power research aircraft began to fly in 1957, the heat-soak problem following shut-down caused H.T.P. left in the engine to decompose violently. The trouble was removed by improving the engine-bay ventilation, by inducing a convective flow of H.T.P. after shut-down, and, in particular, to use main tank pressure after

At the head of the page is a sectioned diagram of the de Havilland Spectre DSpe.1 in its original form, showing the turbopump and drives for the fuel pump and two H.T.P. pumps. Below is a similar diagram of the DSpe.1 in its flight-cleared version, with single fuel injector and many other changes. Later versions of the Spectre are more compact and relatively simpler





DEVELOPMENT OF THE SPECTRE . . .

The curve on the left is that of total running time of complete Spectre engines during the earlier stages of development. Many hundreds of firings have now resulted in an integrated range of highly developed units

shut-down to maintain a small flow of H.T.P. through the engine to an overboard discharge. During SR.53 development it was considered advisable to incorporate a dumping system to drain the fuel injector after shut-down. Another major change was the replacement of the starting system by employing main tank pressure—which, although giving a rather slower initial start, meant that the engine was both primed and started by the same operation. An H.T.P./oil heat exchanger had, up to this point, been employed to cool the oil (particularly the flow used for cooling the turbine seal) and, although the arrangement never caused trouble, it was regarded as a potential hazard and was eliminated.

Unfortunately Mr. Neat was not free to discuss the later and much redesigned Spectre. He was, however, allowed to state that weight and complexity have now been reduced by general re-arrangement. Relocation of the combustion chamber and a change of material has permitted reversion to high-pressure cooling (as originally intended in the Spectre 1) thus eliminating one of the H.T.P. pumps entirely. Several steel parts are now of light alloy, and some of the more difficult seals have been eliminated. The DSpe.4 and 5 (both versions are combined in the Double Spectre) are much lighter than the DSpe.1 and further improvements are in prospect.

It should, for example, be possible to eliminate the gearbox completely, and with it the need for any oil lubrication, by mounting the pumps on the same shaft as the turbine. Another improvement which Mr. Neat suggested was replacement of the separate combustion chamber and cooling jacket by a fabricated one-piece multi-channel chamber, the durability of which has already been demonstrated with H.T.P. cooling over a wide thrust range.

Further References

D.H. Engines 1957, notes on ground- and flight-testing, *Flight*, March 8, 1957.
Spectre (description of DSpe.5), *Flight*, August 23, 1957.
Britain's Combat Rocket, *Flight*, August 30, 1957 (page 288).
Spectre A.T.O. Unit, *Flight*, February 7, 1958.
Double Spectre, *Flight*, August 29, 1958 (page 339).

BLOODHOUND AND ITS HISTORY

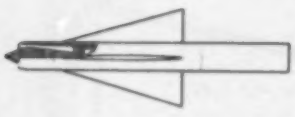
IN introducing a lecture on Bloodhound before the Guided Flight Section of the Royal Aeronautical Society, the chairman —Dr. G. W. H. Gardner, Director of the R.A.E.—commented upon the interest the subject had aroused and upon the large number of people present; although some 200 guest tickets had been issued, it had been necessary to refuse a further 100 applications. The Ministry of Supply—said the chairman—had approached the Bristol Aeroplane Co. in 1949 with regard to the building of a surface-to-air missile. Mr. David Farrar, the Bristol Aircraft chief designer (G.W.) and the author of the paper, had been closely connected with the project since that date.

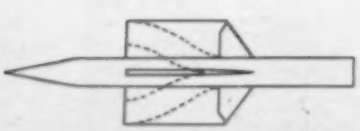
At the start of his lecture Mr. Farrar remarked that a guided-missile system was large and complex, and in preparing the lecture he was faced with the difficulty of having too much material. He had therefore decided to concentrate on the development of the missile itself. From the outset it was agreed that Bristols and Ferranti should be equal working partners in the project, and this arrangement had worked well.

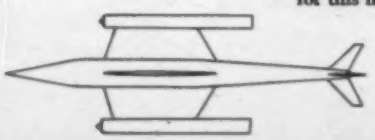
At the time when the project was started there were already two other surface-air missiles under development in the U.K., and the recommendations of an investigating committee were available. This committee had suggested that the main requirements for the weapon were the need for high fire-power, long range and great development potential, without involving new radar techniques. The long-range implied flight at high altitude, and suggested the use of all-the-way homing guidance, coupled with ramjet propulsion; at that time there was no supersonic ramjet in this country. It was decided that the most economical accessory drive would be to use ram-air turbines. Two test vehicles were designed and flown within five months of the start of the work. The first of these was used by Ferranti for guidance development, and was designated CTV-4. The use of sub-miniature valves caused some early failures, but these were overcome by the development of new valve-testing techniques. The other test vehicle was the JTV-1, which not only became the first British ramjet missile to fly at supersonic speed, but also successfully proved various possible boost configurations.

In deciding upon the shape of the actual missile it was necessary to bear in mind the requirements of the radar installation and the need for sub-dividing the components for handling purposes. Three possible families of shapes were investigated, as indicated in the diagram. In the first the ramjet was integral with the missile body and the homing eye was located in the intake nose cone. Space for equipment was naturally restricted, and this difficulty was overcome in the second layout by using side intakes integral with the wings. Lack of knowledge of this intake arrangement counted against it, and finally the use of podded ramjets was chosen as the best solution. After consideration of a number of moving or fixed, two- and four-wing arrangements, with two or four ramjets, the present twin-ramjet, twist-and-steer configuration was chosen. (Mr. Farrar commented that this was the wing arrangement favoured by nature!) The compromise between wing and homing-eye size was decided with a bias towards the latter, as this also helped range potential. The actual shape chosen was much like the present Bloodhound, except that four indexed tail fins and a tandem boost were proposed.

Three configurations examined during the early development of Bloodhound: at left, an integral ramjet body with a homing eye in the nose-cone; below left, a development with leading-edge intakes; below, tip-mounted engines







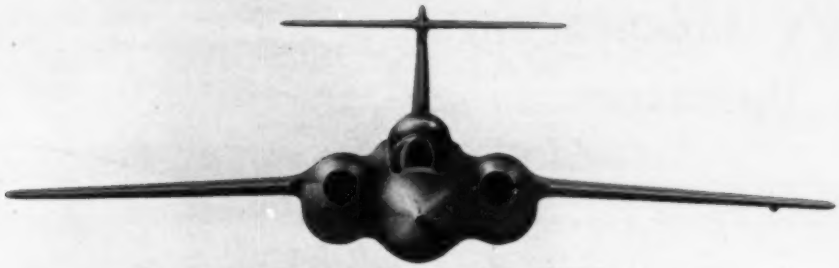
Five different series of test vehicles were used during the development of the actual missile. These ranged from the quarter-scale XTV-1 aerodynamic dart, through one-third scale controlled missiles and full-scale boost and ramjet vehicles, to the final XTV-5 fully guided weapon. During the course of development the tandem boost was dropped in favour of the overlapped type, as trouble was experienced due to lack of stiffness at the missile/boost attachment. A ramjet was designed in the U.S.A. by a joint Bristol-Boeing team. Designated the BB-1, the 16in-diameter unit was constructed, flown to America and had developed full thrust within the short space of nine weeks. After a number of design changes it became the current Thor engine.

Wing/body incidence was found to be sufficient without the need to resort to moving-tail fins, but the cruciform tail arrangement caused unstable effects at high incidence and in the presence of ramjet efflux. These fins were therefore replaced by a pair of fins in line with the wings. The wings do not interfere with ramjet performance, but the shock of the engines helps to counteract the adverse effect of the widening wing-root gap at high angles of incidence. Wings designed to meet the pitch requirements were found to be adequate for roll.

The structure is simple and designed for minimum cost. It uses a large number of magnesium castings, especially for bulkheads, none of which are fabricated. There are two backbone members along the top and bottom of the body, and comparatively thick skins. The wings and fins use a plywood matrix with alloy skins. All components are ground-tested in a representative flight environment using infra-red heating lamps.

There are two control loops, for pitch and roll. The basic response of the roll loop is fast, and roll rates and accelerations are high. It is altitude-corrected, and yaw coupling effects are small. A homing system is not so likely to cause the missile to spiral as is beam-riding, since there is a relative phase-advance in roll. The electronic components were designed on the principle that few valves would fail catastrophically. Each valve therefore does the minimum number of jobs in the hope that the effects of a partial valve failure will not be too severe. Potting of units was tried, but abandoned in favour of open units built up on printed circuits. Some transistors are used at critical places. Although a D.C. control system was employed initially, the excessive drift experienced resulted in the adoption of A.C. The electrical generator is driven by an oil pump as this assists control and ground running.

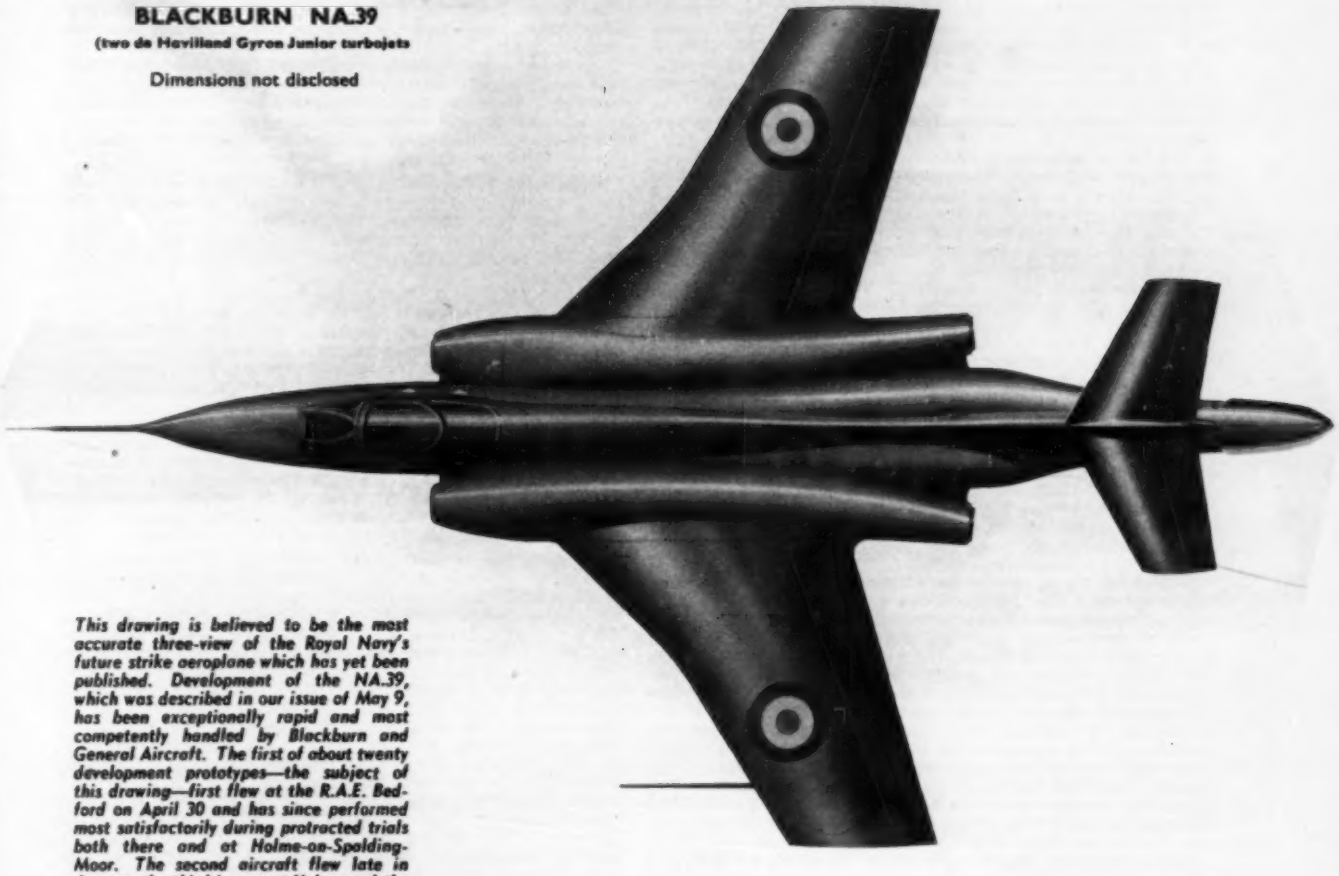
Following Mr. Farrar's paper a film was shown, illustrating some of the failures which occurred in development work. It included some remarkable coloured shots of ramjet operation in flight, and concluded most appropriately with an example of the successful destruction of an evading Meteor target aircraft by a Bloodhound missile. In concluding, Mr. Farrar said that success was due in large measure to the freedom and encouragement given to the design team, and Dr. Gardner was amongst those to be thanked for this happy state of affairs.



BLACKBURN NA.39

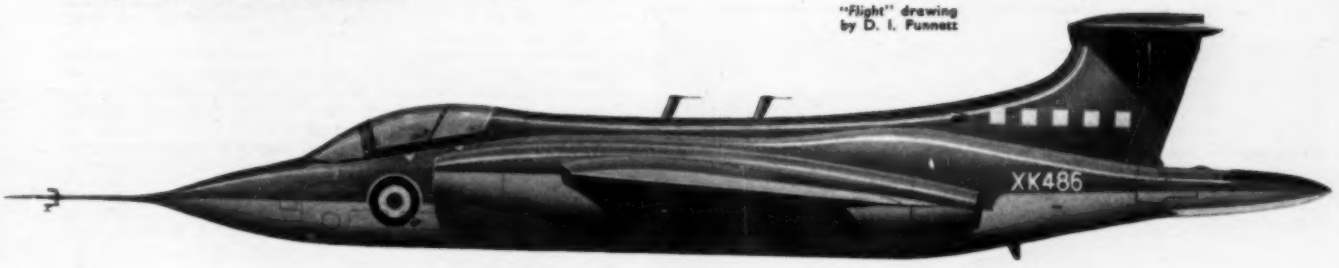
(two de Havilland Gyron Junior turbojets

Dimensions not disclosed



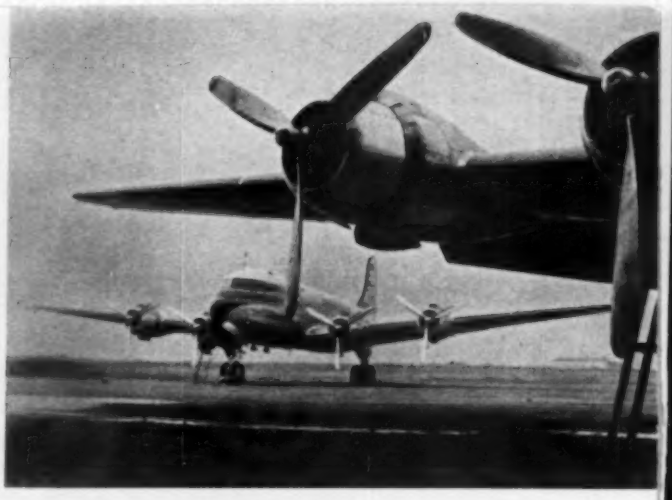
This drawing is believed to be the most accurate three-view of the Royal Navy's future strike aeroplane which has yet been published. Development of the NA.39, which was described in our issue of May 9, has been exceptionally rapid and most competently handled by Blackburn and General Aircraft. The first of about twenty development prototypes—the subject of this drawing—first flew at the R.A.E. Bedford on April 30 and has since performed most satisfactorily during protracted trials both there and at Holme-on-Spalding-Moor. The second aircraft flew late in August; the third is now at Holme and the remaining aircraft are coming along rapidly. The NA.39 is designed to carry a heavy load over long ranges at near-sonic speed, and it incorporates extensive boundary-layer control to increase economy, reduce drag and provide excellent handling down to a remarkably low minimum speed. A production order has been placed

"Flight" drawing
by D. I. Punnett



Germany's Independent Air Operators

STATE AND INDEPENDENT LINES CO-EXIST—AND STEADILY EXPAND



Two Transavia DC-4s drawn up outside the airline's engineering base at Dusseldorf

THE extraordinary growth of German air transport is certainly the most arresting recent feature of the European civil aviation scene. The story of Lufthansa's rebirth is well known: revived in 1954, Germany's national carrier has in the subsequent four years developed into a major international airline equivalent in size to Sabena. From 1,000 personnel at the time services began in April 1955, Lufthansa's staff has now grown to over 5,000.

But Lufthansa's emergence has overshadowed a parallel growth on the part of Germany's independent carriers. These got off to a rather slower start, but over the last year they have expanded rapidly. The five major airlines now produce an annual ton-mile capacity equivalent to more than one-third of that of Lufthansa and their total seating capacity (about 1,200 seats) is almost equal to that of the national carrier.

Two factors in particular contributed to the growth of both Lufthansa and the independents. Until 1955 the Peace Treaty forbade any German organization from owning aircraft or training aircrew. Withdrawal of these restrictions immediately opened up the way for the development of Germany's own air services. But the subsequent growth of these services—scheduled and non-scheduled—has been the result of the country's bounding economy. Judged by the standards of recent years, the German productive machine has been slowed down by the business recession which is affecting all Western Europe. Yet, while passenger traffic at Europe's two leading airports—London and Paris—in the first half of this year increased by only 2.0 and 0.4 per cent respectively over that for the corresponding period last year, at Frankfurt the increase was 30 per cent. Such rates of growth have provided ample room for the flag airline and the charter carriers to live and expand together.

A further factor which has encouraged the growth of the independents is the collapse of the used-aircraft market. Since the major airlines' jet re-equipment programme moved under way, prices of secondhand airliners have dropped steadily. Until a year ago the leading German independents relied almost entirely on Vikings. Today three-quarters of their ton-mile capacity is provided by DC-4s or Convairs and it will not be long before DC-6As and 6Bs make an appearance.

As in this country, relaxation of defence restrictions was followed by the appearance of a multitude of so-called airlines and their total number soon exceeded 30. Today, although 24 private operators remain on record, 13 of them are in effect providing no more than taxi services using light aircraft. The other 11 are recognized by the Federal Ministry of Transport to be operators of non-scheduled services, but of these only five—Aerotour, Condor, Deutsche Flugdienst (D.F.G.), Lufttransport Unternehmen (L.T.U.) and Transavia—can be described as airlines. Each of these has an interesting if somewhat complicated background, and to trace their individual histories is to follow an interesting chapter in the story of modern air transport.

Aerotour Deutsche Luftreederei, A.G. The name Aerotour was adopted only last winter, the airline having been founded early in 1957 as Columbus Luftreederei. Charter services were operated from Hamburg with two Vikings purchased from Central African Airways and registered under the name of Herr Alfons Amann, an aircraft dealer in Munich. In November 1957 these aircraft were acquired by Herr Helmut Krukenburg and the airline's name was changed from Columbus to Aerotour. Early this year Aerotour obtained two DC-4s from the Eastern Aircraft Sales Corporation (an American aircraft-marketing organization that had purchased T.W.A.'s fleet of six redundant DC-4s). It is likely that Aerotour will receive another two of these aircraft in the next few months. Most of the company's charter activities are on behalf of Aeropa, a Hamburg travel agency controlled by Herr Krukenburg.

Condor took delivery of two Convair 440s in July

Condor Luftreederei G.m.b.H. Condor was established even more recently than Aerotour, having been formed only last November. Operations began in July from the company's base in Hamburg, the fleet consisting of two Convair 440s (purchased from the manufacturers) to which may be added a DC-6A. Condor's capital stands at DM.1m, and is either held or controlled by Dr. Rudolf Oetker. The name Oetker is well known throughout Germany as a popular brand of baking-powder, and the family behind this old-established business has acquired substantial investments in insurance (the Condor group of companies) and in various shipping companies (Hamburg-Sudamerikanische, Deutsche Levante-Linie, Florida Schiffahrt, Albatros Reederei, Reederei Union and Reederei Rudolf A. Oetker).

Condor's charter flights will include a considerable proportion of work for the shipping companies controlled by Dr. Oetker, his plan being to offer combined air-sea tours. Managing director of the airline is Dr. Rolf Kersten and the principal executives are H. Howell, acting general manager; H. Seifert, engineering manager; Capt. R. Mergelsberg, operations manager; and Capt. G. Pahnke, chief pilot.

Deutsche Flugdienst G.m.b.H. This company was founded in December 1955 with an initial capital of DM.3m contributed by Nordeutscher-Lloyd and Hamburg-Amerika (each of these two shipping companies holding 27¼ per cent of the capital), Lufthansa (26 per cent) and the German State Railways (18½ per cent). As Lufthansa's capacity was insufficient to allow direct participation in the growing non-scheduled market, participation in D.F.G. appeared to be a practical alternative. Operations began from Frankfurt in April 1956 with four ex-B.E.A. Vikings: one of these aircraft was chartered to Lufthansa for use on internal scheduled services, but the others were employed on non-scheduled operations, the three principal travel agents involved being Touropa, Scharnow and Hummel.

Last January the airline's capital was increased to DM.6m and five Convair 240s were purchased from K.L.M. (plus an option on a sixth 240). It was also announced at the time that four-engined aircraft were to be purchased in the autumn of this year. Acquisition of the Convair fleet has permitted a sharp expansion in charter operations (the Vikings will now be concentrated on freight). The company has been affected by restrictions on non-scheduled flying recently proposed by the Austrian and Italian governments to protect their national carriers. To overcome the difficulty of flying to Austria, D.F.G. has come to an agreement with a newly formed company, Austria Flugdienst, whereby services can be maintained. In the case of Italy, Alitalia sought to win government support for banning non-scheduled services from Germany to Naples and Catania. Although no ban has been placed on this year's operation, it is likely that next year's services will be limited.

In their early stages D.F.G. had negotiated a management agreement with Airwork, Ltd., but this has now been terminated. Recently an agreement has been reached with another Convair operator, Condor Luftreederei, whereby engineering and operating arrangements will be rationalized (D.F.G. concentrating on Western and Mediterranean areas, Condor concentrating on Scandinavia). Managing director of D.F.G. is Eberhard von Brauchitsch, formerly of Lufthansa.

Lufttransport Unternehmen G.m.b.H. This company was founded as Lufttransport Union in February 1955, largely through

the initiative of Mr. Bernard Dromgoole and Mr. M. Myhill (both of whom are directors of Overseas Aviation, a British carrier based in Jersey). Initially, L.T.U. acted only as an agent but in November 1955 a fleet of four Vikings was acquired (two from Eagle, one from Alfons Amann, and one from B.E.A.). A fifth Viking was acquired in 1957 from Field Aircraft Services.

Alteration in the German law concerning foreign participation in local companies made it necessary for British interests to be withdrawn, and the company's capital of DM.½m is now entirely contributed internally. The present name was adopted last April to avoid confusion with Union Transport Betriebe, a Dusseldorf firm of freight forwarders.

Shortly after starting operations in March 1956 L.T.U. applied to the Ministry of Transport to conduct scheduled services between Dusseldorf, Hamburg and Munich, but this was refused. The company has continued to operate charter services, concentrating on inclusive tours to the Mediterranean for Transeuropa (Munich), Aeropa (Hamburg), H. Otto Deutsche Flugreisen (Hamburg), Turadio (Munich) and Luftomnibus (Munich). The airline recently formed a subsidiary company, Luftouristik Unternehmen Seibert, to arrange inclusive tours. L.T.U. have also operated various inclusive tours and freight services on behalf of Sabena and K.L.M.

Restrictions on non-scheduled services imposed by the Austrian Government led to some difficulty this summer, but the formation of Aerotransport, an Austrian independent with which L.T.U. is closely associated, has allowed the resumption of charter services to Austria. The threatened Italian ban on charter flying has not yet materialized but is expected to be put into effect next year. L.T.U. would be severely affected by such action.

Early this year a DC-4 was acquired from Twentieth Century, an American company that had previously obtained this aircraft from A.N.A. The DC-4, together with a Bristol 170 purchased from the British War Office in 1957, now form the basis of L.T.U.'s fleet, and their smaller aircraft are being sold: one Viking to Aerotransport; two other Vikings to Aviameer; and a Dove to Martins Air Charter (the last two companies being newly founded independent carriers in Belgium and the Netherlands respectively).

Deutsche Luftfahrtberatungsdienst, an associated company, is the principal supplier of Viking spares in Germany. Chairman of L.T.U. is Mr. Curt Conle, the other directors being Ernst Seibert and William Sachsenberg. The airline's manager is E. von Manteuffel.

Transavia Flug G.m.b.H. Although Transavia was only founded in December 1957 the airline's predecessors go back as far as 1949, when Aero Express was founded in Munich by Herr Russell, a director of the pre-war Lufthansa. After an erratic history this company suspended operations in 1956, its fleet of five Vikings being acquired by Herr Karl Herfurtner, a well-known German hotelier. A sixth Viking (ex-Eagle) and two DC-4s were later added to the fleet and the airline became known as Luftreederei Karl Herfurtner. During 1957 one of the Vikings crashed at Palma and in the autumn of that year one of the DC-4s was destroyed on taking off from Dusseldorf on a trans-atlantic charter flight. Shortly afterwards the company was taken over by Dr. H. Tigges and Dr. A. Fischer, joint owners of an old-established travel agency based in Wuppertal and trading under the name Tigges Fahrten. Tigges-Fischer had previously been Karl Herfurtner's chief customer, and they now proceeded to reorganize the airline, renaming it Transavia Fluggesellschaft (using the initials of the two owners) and establishing its initial capital at DM.1m. A replacement DC-4 was acquired, and it is possible that DC-6 equipment will soon be obtained.

Transavia is run on the basis that two-thirds of the total capacity is reserved for Tigges Fahrten, the remaining capacity being available for outside charter. A high proportion of flying is on routes to Palma and Teneriffe which attract considerable volumes of both summer and winter traffic. Annual utilization rates average 1,800 hr for each of the DC-4s and 1,300 hr for the Vikings. With the acquisition of more four-engined equipment, the five Vikings will be put on to freight operations. At their own base at Dusseldorf, Transavia conduct all their maintenance except for DC-4 engine overhauls which are undertaken by S.A.S. on a powerplant exchange basis. Transavia's manager is Herr P. Lauxen.

J. C. S.

AZTEC AIRLINE

RUMOURS are circulating to the effect that Mexicana may soon acquire control of Aeronaves de Mexico. This merger would result in an organization larger than the Brazilian consortium REAL, currently Latin America's largest airline. Here is a brief history of Mexicana.

IT was on August 20, 1924, in the booming oil town of Tampico, that Compañia Mexicana was registered as an airline. Its fleet consisted of three small Lincoln Standard biplanes and its pilots were American barnstormers. An American banker, George L. Rihl (who later became the airline's first president), possessed considerable daring and far-sighted vision in those troubled times of Mexico's "reign of terror": armed bandits were robbing and murdering the paymasters who travelled from Tampico to the oilfields in the rich Hunsteca region in the Republic's north-eastern state of Veracruz. Rihl's idea was to fly these paymasters to and from the oilfields. Thus was born Mexico's first airline.

Later, having acquired two Fairchild cabin monoplanes, Mexicana continued operating to the oilfields; they also began a once-weekly service between Tampico and Mexico City, taking about four hours; today the direct flights (twice daily) take a mere one hour 20 minutes. On April 25, 1928, the Mexican Government awarded the company the country's first air-mail contract, and on October 15 of the same year scheduled services were started between Mexico City and the capital cities of the south-eastern provinces of the Republic (Yucatan, Campeche, Tobasco and Veracruz). Before these operations could begin, a great amount of exploration, surveying and the construction of landing-grounds had to be done, the whole cost of which had to be borne by Mexicana.

At this time Pan American Airways were spreading southwards into the Caribbean and sought a foothold in Mexico. This they achieved in January 1929 by purchase of Mexicana's entire capital. Although this share was reduced to 42 per cent in 1944, a close connection has continued between the two airlines. The origin of Mexicana's present fleet is evidence of the association: eleven of their 19 DC-3s and three of their DC-4s have previously flown in PanAm colours (one of the DC-3s, XA-CAG (c/n 2228), has now logged over 30,000 hr).

Mexicana's operations were extended in 1935 to Los Angeles and Lockheed Electras were acquired for this service. In 1942 Havana was added to the network and the fleet was strengthened afterwards by the addition of DC-4s. Mexicana was one of the first non-U.S. carriers to purchase DC-6s and in 1954 this fleet of three was supplemented by two DC-6Bs taken over from P.A.L. after the Philippine carrier abandoned long-range services. These two aircraft were soon exchanged for two PanAm DC-6s, leaving Mexicana with a standard long-range fleet. Three Fairchild Packets (C-82s) were purchased in 1955 for use on freight services. These aircraft have proved most successful, and a fourth has recently been acquired. The latest procurement involves the acquisition last year of four DC-7Cs for operating to the U.S. The airline had hoped to receive permission to operate the Mexico City - New York service, but this went to Aeronaves de Mexico, who placed Britannias on the route. Subsequently Aeronaves, in which PanAm also has a substantial shareholding, took over Mexico's third major airline, Aerovias Guest.

The next developments in Mexicana's equipment programme are being keenly awaited by rivals and by manufacturers; there is probably no other airline of this size that has not yet ordered jets.

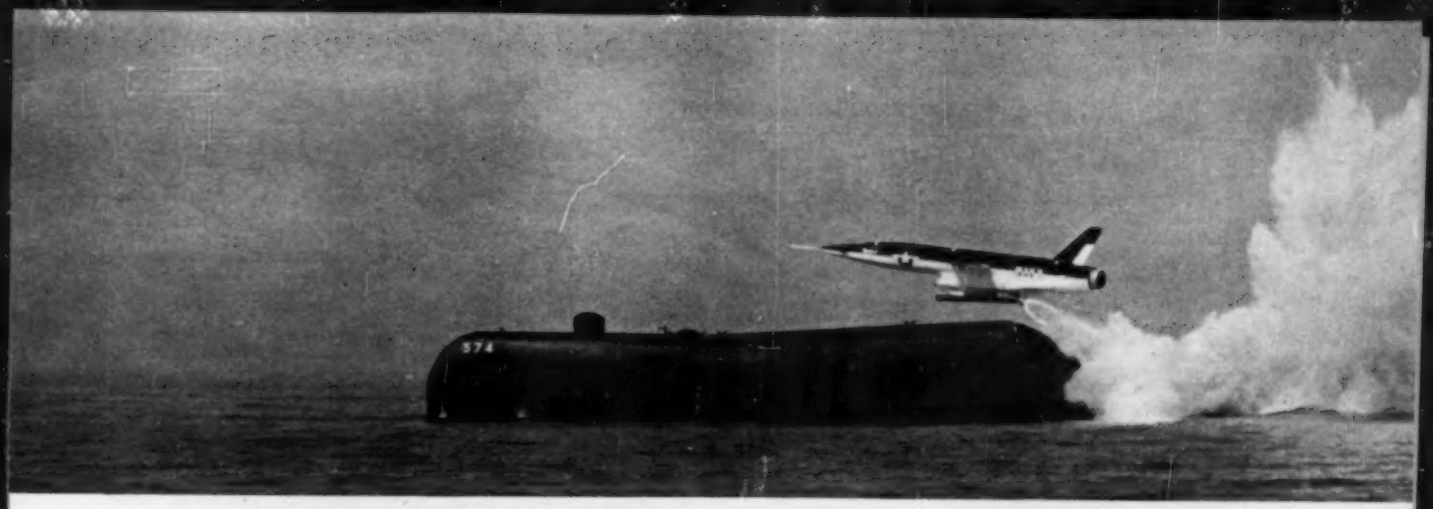
The original 92-mile route between Tampico and Tuxpan has now expanded to a system covering an unduplicated network of 7,000 miles. Compared with the handful of barnstorming pilots back in 1924, personnel today number about 3,500.

Mexicana's greatest single contribution to the prosperity and education of Mexico must be the distribution of newspapers, within hours of their being printed in Mexico City, to every town in its network. This service is of vital importance to the manufacturing centre of Monterray, where the Republic's heavy industries are located.

D. M. P.

XA-DUK, with nearly 30,000 airframe hours, is among Mexicana's earliest equipment. The most recently acquired aircraft were the four DC-7Cs (lower picture) used on the trunk routes from Mexico City to Chicago and Los Angeles

FLIGHT, 770-771
14 *November* 1958



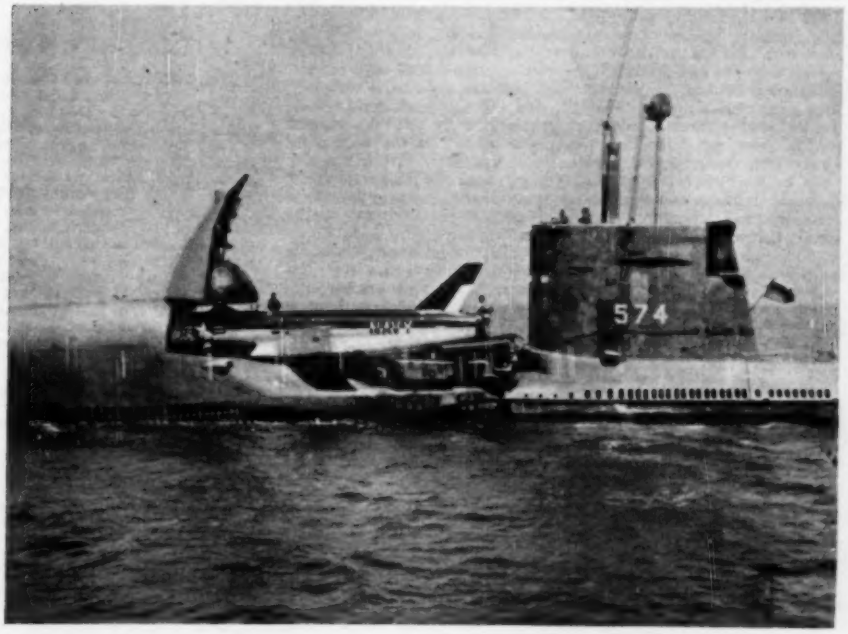
TINFISH OF THE MISSILE AGE

AS these photographs suggest, the U.S. Navy is well on the way to possessing one of the most potent weapon systems of all: the long-range bombardment missile fired from a submarine. This concept—described by an American admiral as "the mating of the hawk and the shark"—will continue to play an important rôle even when the more advanced Polaris submarine-launched IRBM becomes operational.

Vehicle in the present system is the Regulus II, by Chance Vought Aircraft, Inc. A supersonic, winged, air-breathing, cruise-type weapon, Regulus II is powered by a 15,000 lb-thrust General Electric J79-GE-3A turbojet with afterburner. Its internal tankage is sufficient for a range in excess of 1,000 miles, and the maximum level speed is greater than Mach 2. Sperry, AC Spark Plug and Stavid Engineering combine to supply the radio-inertial guidance system, and a thermonuclear warhead can be carried.

Regulus II's design was completed in the autumn of 1954. The first prototype, one of a number of recoverable rounds fitted with a retractable landing gear, started its flight trials on May 29, 1956; and before the end of that year these vehicles had already exceeded Mach 1.5 and flown above 50,000ft. On November 13, 1957, an operational type of round was launched under the immense thrust of its Aerojet-General boost rocket. The completion of the weapon system was brought nearer by the launching on March 7 of this year of the 3,600-ton U.S.S. *Grayback*, one of the largest conventionally propelled submarines. On July 23 *Grayback* fired a simulated Regulus II vehicle, and the first genuine firing took place in the Pacific on September 16, and is shown in these photographs. Other submarines which will carry Regulus II include *Growler*—sister of *Grayback*—and the nuclear vessels *Halibut*, *Permit*, *Pollack* and *Plunger*.

Below, the missile is being winched backwards out of its watertight hangar on the foredeck. It emerges on to a rotatable launcher which, in the left-hand view, has been swivelled to the athwartships firing position; the hangar door is then closed. The firing is depicted above, the thrust of the boost rocket being great enough to confer a high acceleration in both horizontal and vertical planes.



The Aeronautical Bookshelf

One of Peter Shepheard's chapter-head illustrations to Admiral Jameson's "The Wandering Albatross," reviewed on this page

The Fastest Man Alive, by Lt-Col. Frank K. Everest, Jr., U.S.A.F., as told to John Guenther. Cassell and Co., Ltd., 35 Red Lion Square, London, W.C.1. Price 21s. Illustrated.

THE small, select, company of pilots who have flown at twice the speed of sound are eagerly listened to by their less swift comrades (the "supersonic in a dive" chaps) and held in some awe by laymen. But flying at Mach 2—and presumably Mach 3, 4 and 5 for that matter—does not alter a man's character or personality. Col. Everest's life story is told in quite orthodox manner from childhood to his few brief seconds of flight at nearly Mach 3 in the Bell X-2.

The U.S.A.F. is far out in front of other air forces in the field of really high speed flight and has a series of operational supersonic aircraft which are only now being equalled, and perhaps bettered, by European countries. Everest tells of some of the arguments and snags which came about as these aircraft and their predecessors were developed. Several F-84s lost their wings in flight and after tests by Wright Field came the decision to have stronger wings, to redesign the control system and modify the tail. "When these changes were made the problem was licked"!

It was at about this time that Everest recognized that a test pilot had to be a flying scientist and that pre-war aviators who flew by the seat of their pants "were as outdated as the wood-and-canvas aeroplanes they flew." He forthwith set about training himself by privately studying aerodynamics and engineering and so opened a way to join the ranks of the most eminent test pilots in the world.

Almost any of the anecdotes and comments in his story would be worth quoting. In the X-1 he once connected his oxygen tube to a nitrogen bottle and nearly suffocated himself. It was in this aeroplane that one of the problems which is still with us made itself known—the inadequacy of flight instruments in really high-performance aircraft. The crude altimeter gave readings in tens of thousands of feet up to 80,000ft, and a standard altimeter which gave much closer readings was useless above 50,000ft. The scientist pilots were back to flying by the seat of their pants!

Everest flew both the Hunter—a nice aeroplane to fly, he reported, but not offering a substantial performance increase—and the Javelin. The latter, he says, had "a good rate of climb and we felt it had a lot of potential"—if the wings were thinned out (a project since abandoned by the Government) and the engines given reheat (as in the latest Mark 7). After flying these two, Everest tested the Mig-15 and summed it up as "not a good aeroplane, regardless of what some pilots said about it." A. C. B.

The Wandering Albatross, by William Jameson. Rupert Hart-Davis, Soho Square, London, W.1. Price 16s. Illustrated.

THIS is a fascinating account of the life and habits of a magnificent, mainly solitary bird—*Diomedea exulans*, the wandering albatross. Living in the windiest parts of the world, broadly between 30 deg and 60 deg S, this bird is often out of sight of land for years at a time, using the wind-gradient above the waves to soar almost indefinitely during the day, often patrolling across the wake of a ship for vast distances, and alighting on the sea only to feed and to sleep. With wings spanning up to 12ft, the wandering albatross is the largest surviving flying creature. "Its instinctive knowledge of meteorology, aerodynamics and applied mechanics," Admiral Jameson writes, "is as marvellous as its split-second reactions to the constantly changing conditions, particularly in the highly turbulent air around the waves."

The chapter describing how the bird's continuous dynamic soaring is accomplished is based on Prof. Idrac's theory and conclusions, and is the key to an understanding of the phenomenal flying performance of the wandering albatross. Other chapters deal with the author's and others' observations of the bird, its history and fable, and its dignified, ritualistic courting. The book's informative and readable prose is illustrated with photographs from several sources and with sketches by Peter Shepheard.

S. A. O.

The World's Sailplanes. Published by Organisation Scientifique et Technique Internationale du Vol à Voile (OSTIV) and Schweizer Aero-Revue. Obtainable from the British Gliding Association, Londonderry House, Park Lane, London, W.1. Price 17s 6d. Illustrated.

FOR many years there has been a strong need for a comprehensive international reference book on gliders and sailplanes, and it is appropriate that OSTIV should have sponsored the first book to meet this need. The appearance of *The World's Sailplanes* is due in large measure to the efforts of Miss Betsy Woodward, the U.S. pilot, during her time as a research worker at the Department of Meteorology, Imperial College, London, in the long job of collecting and collating information from the world's glider manufacturers and national authorities. The checking of data was carried out by an editorial committee comprising K. G. Wilkinson, Peter Brooks and B. S. Shenstone, and a useful introduction to the book in the shape of Mr. Shenstone's review *Present State of Sailplane Design* precedes the listing by countries of the gliders and sailplanes. The attempts to provide full technical data in standardized form for all gliders has produced an impressive result: as only primary information sources have been used, those gaps which remain are the fault of the manufacturers themselves. Only important reservation to accuracy is that the majority of performance figures are estimated and not measured.

Some 140 sailplanes are included, and together they illustrate Shenstone's conclusion to his introductory review. Compared with pre-war gliders, he writes, today's craft are smaller, with higher wing loadings and span loadings but improved design in wings and detail aerodynamics. Specific structure-weights are tending to rise. Modern sailplanes have minimum rates of sink as good as in the past, while their high-speed cruising performance and manœuvrability are far better. K. T. O.

Gliding. A Handbook on Soaring Flight, by Derek Piggott. A. and C. Black, Ltd., 4-6 Soho Square, London, W.1. Price 25s. Illustrated.

"DURING your first visit to a gliding site you may get the opportunity to fly in a glider as a passenger . . ." So begins Derek Piggot, who takes one from this first visit to a gliding site to advanced soaring, instrument flying and owning one's own sailplane in some 250 pages of straightforward, matter-of-fact instructional talk, subject by subject and thought by thought. Well qualified by his past gliding experience and current position as chief flying instructor at this country's largest gliding centre, the author has transferred to the pages of his book his cockpit and club-house explanations of what the student pilot should do, and how and why to do it, with little wasted effort on the finer points of writing style or sub-editing for readability.

If one chooses to read the book in one stretch from beginning to end the effect is inevitably of mental indigestion, but, used as intended as a guide for the novice through the various stages of learning to glide, *Gliding* is a thorough and valuable contribution. It should reduce markedly the too-high frustration factor among pupils in British gliding today. It will also be welcomed gladly by hard-pressed instructors everywhere, who so often will be justified in demanding "Read Piggott, chapter 8, before your next circuit with me, or else . . ." An oral test on Piggott, chapters 19, 20 and 23, also, might well be required before taking the club Olympia or Skylark away for the first time on a cross-country flight. K. T. O.

OTHER BOOKS RECEIVED

Sell's British Aviation 1958. Business Dictionaries, Ltd., St. Dunstans House, 133-137 Fetter Lane, London, E.C.4. Price 20s.

Secret Bomber, by W/C. H. P. "Sandy" Powell. Allan Wingate (Publishers), Ltd., 12 Beauchamp Place, London, S.W.3. Price 13s 6d.

The Exploration of Space, by Arthur C. Clarke. Penguin Books, Harmondsworth, Middlesex. Price 3s 6d.

Space Exploration, by Patrick Moore. Cambridge University Press, Bentley House, 200 Euston Road, London, N.W.1. Price 3s.

Best Foot Forward, by Colin Hodgkinson. Beacon Books, Odhams Press, Ltd., 24 Henrietta Street, London, W.C.2. Price 2s 6d.

Aircraft Annual, edited by John W. R. Taylor. Ian Allan, Ltd., Hampton Court, Surrey. Price 10s 6d.

Rockets and Missiles, by Maurice Allward and John W. R. Taylor. Ian Allan, Ltd., Hampton Court, Surrey. Price 2s 6d.

Hitler's Pilot, by Lt-Gen. Hans Baur. Frederick Muller, Ltd., Ludgate House, 110 Fleet Street, London, E.C.4. Price 18s.

Basic Aeronautical Science and Principles of Flight, by Robert D. Blacker. The Technical Press, Ltd., 1 Justice Walk, Chelsea, London, S.W.3. Price 50s.

Men and Machines (A History of D. Napier and Son, Engineers, Ltd., 1808-1958), by Charles Wilson and William Reader. George Weidenfeld and Nicholson, Ltd., 7 Cork Street, London, W.1. Price 35s.

Plane Crash, by Clayton and K. S. Knight. Elek Books, Ltd., 14 Gt. James Street, London, W.C.1. Price 18s.

Aircraft and Missile Propulsion, Vol. 1, by M. J. Zucrow. Chapman and Hall, Ltd., 37 Essex Street, London, W.C.2. Price 92s.

Satellites, Rockets and Outer Space, by Willy Ley (Signet Key Book), The New American Library of World Literature, Inc., 501 Madison Avenue, New York 22, N.Y. Price 3s 6d.

Experimental Investigations into Various Sharply Tapered, Slim Bodies of Rotation at High Supersonic Speeds, by H. R. Voellmy. Aerodynamic Institute of State Technical High School, Zurich. Verlag Leeman AG., Arbenzstrasse 20, Postfach, Zurich 34. Price SFr. 17.

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British Aviation's Present and Future

Sir Henry Royce Memorial Lecture at Derby

THE formation of a Ministry of Aviation and Astronautics was suggested by A. Cdre. F. R. Banks, C.B., O.B.E., Hon.F.I.A.S., F.R.Ae.S., vice-chairman, Bristol-Siddeley Engines, Ltd., in his lecture, *The Present and the Future*, before the Derby branch of the Royal Aeronautical Society on November 3. This paper, presented as the third Sir Henry Royce Memorial Lecture, included the following extracts.

"The aircraft industry has been faced in recent years with a much-reduced scale of military ordering and considerable contraction; but while this has all been expected and accepted, there has not yet been any official move to plan properly with the industry its rundown or reduction and settle the nature and scope of its future rôle. In other words, the British aircraft industry has drifted along for two or three years with little or no practical guidance or a firm and definite policy from official quarters . . .

"Those optimists who say there is nothing wrong with the industry and point to the present high level of exports in aviation materiel are apt to forget that, after all, these are largely the result of full Government support in the past for all research and development up to, at least, the production stage . . .

"In the particular case of military aviation, while it is impossible to have numerical superiority or even equality with America and Russia, the Royal Air Force must, above all, have equipment of superior quality and performance. Although our bombers are good they are relatively few in number, and there is not yet a supersonic fighter in operational service today.

"The dangerous and loose thinking of recent years, putting the guided weapon and ballistic missile prematurely in the position and rôle of the ultimate rather than the complementary weapons, and seeking virtually to eliminate the manned aircraft, is, unhappily, still with us . . .

"One of the most important commands in the Royal Air Force today is Transport Command, but it is only of moderate size and is comparatively ill-equipped; and while orders for new transports have been given, these are minimal. Transport Command should be capable of carrying a considerable force to any trouble spot in short time; but it is doubtful, even with the delivery of the new aircraft, whether it will be able to operate as expeditiously and efficiently as it should . . .

"The cost of designing and developing a 15,000 lb thrust turbojet to the initial production stage is somewhere between £10m and £15m, which can be even further increased, towards £20m, in the case of its civil application by the sheer bench and flight time now expected before the engine is accepted for regular airline service . . .

Gas-turbine Needs

"Personally, I cannot foresee any new or far-reaching developments in gas-turbine technology during the next decade, although there will be greater recognition of the need for improved operating economy and reliability which may lead to the further encouragement of the low-temperature turbojet, the bypass and also the ducted fan. But while these engine types will probably give what is expected of them in specific fuel consumption on the test-bed, they have eventually to prove themselves in flight. Their larger diameter and, therefore, increased "drag" could possibly vitiate in airline operation the gross improvement in test-bed fuel economy.

"Due to Mach Number limitation, greater thrust could only offer improved take-off and rate of climb—which might nevertheless be worthwhile; but if a reduction in specific fuel consumption of somewhere between 10 and 15 per cent were possible, and the cost of re-engining did not outweigh this improvement, such a course could result in improved profits or, perish the thought, cheaper air travel. In this connection, it is significant that two of the leading American engine manufacturers are also developing bypass and ducted-fan engines—or turbo-fans as they are known in the States . . .

"It is probably true to say that no government, whatever its political colour, has ever "been good" to the aircraft industry. Most have been short-sighted and dilatory, and only when it was necessary to re-arm because of the threat of war has adequate support been, of necessity, forthcoming. But the cost of building up an industry, after allowing it to run down, is always vastly greater than it otherwise would have been in keeping it compact and healthy by an imaginative research and development programme and realistic procurement . . .

"Whatever the outcome regarding the manned aircraft versus the guided weapon and ballistic missile, the orders for military aircraft are going to be exceedingly small in number and it is obvious that the engine industry of this country must contract. It is, however, desirable to have two major manufacturers so as to provide some measure of competition and steady improvement in quality, and also to ensure availability of a variety of types . . .

"It is no longer possible to sell engines on the 'old boy' basis or to make a deal 'over the bar-room counter.' In fact, it demands the unremitting effort and attention of everyone from the managing director downwards to sell an aero-engine today; and even if one engine appears to offer somewhat better performance possibilities than another, the choice may not necessarily fall upon the former. Since, although it must naturally give the required performance when built, the successful engine may have been chosen because of better sales strategy and tactics, more running background of the basic engine type or the greater experience and reputation of its manufacturer—all leading to a progressive build-up of customer confidence . . .

"For a new civil engine, about 10,000 hours of test bench running and some 5,000 engine flight hours are desirable—with 10,000 hours as the target. But the provision of suitable flying test-beds is not getting any easier and, with engine and aircraft design starting at the same time, it is becoming more difficult to accumulate flying hours before the aircraft proper is built . . .

"It is interesting to note what is happening in the aviation and allied fields in the States today, where those concerned are now looking further ahead and becoming "space cadets" in anticipation of, and in preparation for, the exploration of outer space —sometimes, it may be thought, to the detriment of more immediate and profitable activities. But, whatever the problems, the rapidity with which research into hypersonics and space techniques (astronautics) has progressed, together with the investigation of all the possible propulsion methods, is remarkable.

Space Technology

"The term 'astronautics' is not always properly understood. Academically speaking, it comprises a number of different sciences and technologies such as higher ballistics, celestial mechanics (an advanced form of study of gravitational effects and orbits, etc.) and the development of various possible propulsion systems. In practice, the ICBM represents the lower limit in astronautics and from there they progress through glide vehicles, such as the U.S. Dyna Soar project, satelloids (which are put into lower orbit than the satellite and are kept going with periodic bursts of power) and orbitals (satellites or sputniks), all of which lead towards the probe vehicle and then the 'spaceship' of the future. The orbitals include 'recce' and observation satellites and 'jump-down' weapon systems, etc.

"The Lewis Flight Propulsion Laboratory at Cleveland, which was created with very elaborate research and test facilities for the gas-turbine era, anticipating a long evolutionary period, is now actively planning to use these various facilities for research into new forms of propulsion, leaving only about a twenty-per-cent availability for such *ad hoc* work on gas turbines as may be demanded by the Armed Services and industry; eighty per cent of the establishment and facilities being split, according to needs and progress, between nuclear propulsion, rocket motors and such things as ion rockets and plasma jets, etc. . . .

"There is, in this country, a committee (Supersonic Transport Aircraft Committee) composed of members of the Government departments concerned and the industry, which has been investigating the problems associated with the development of the supersonic passenger aircraft. But since the committee is only advisory its deliberations may continue for some time, and any advice that it might then tender could well be out of date or misleading to an original thinking design team. The whole effort appears too leisurely if it is really intended to consider seriously the supersonic airliner and back it nationally . . .

"When considering the supersonic passenger machine, the question of the benefits of vertical take-off and landing (VTOL) or short take-off and landing (STOL) naturally arises; but the additional development effort and time needed to bring these features to a safe and practical state would add considerably to the already formidable problems facing the designer and manufacturer. It seems, therefore, more practicable first to try them on a military transport or a bomber, particularly if they are of the multi-engine integrated design proposed by Dr. Griffith . . . In any case, an aircraft designed to fly at Mach 3 at 70,000ft should have sufficient power for take-off on the runways already being made available to the large subsonic jet machines."

In conclusion, A. Cdre. Banks made the following points:—

"I have, perhaps, tried too hard to make clear the obvious: that the aircraft industry cannot in future expect to remain at its present potential. But it is a national characteristic or trait that impels, or compels, some members of the industry to be somewhat unrealistic in accepting the facts of life. And it is this lack of realism, coupled with just sufficient official support to keep the

BRITISH AVIATION'S PRESENT AND FUTURE . . .

flywheel turning, which lulls those who indulge in daydreams, of the glorious past and optimistic future, into a false sense of security or a state of unwarranted self-satisfaction.

"With their limited domestic outlets, none of Western Europe's aviation industries can indulge in the development of large civil aircraft or their engines without government support; and the choice of other work is likely to be very restricted unless the necessary finances are available to provide the tools and tooling for the manufacture of something considerably more prosaic—with, of course, the inevitable break-up of invaluable technical teams.

"So far as the British aircraft industry is particularly concerned, it must be assumed that, despite the apparent lack of realism displayed in official quarters, it would be the national wish to keep the industry strong and competitive both in the military and civil fields—although the happenings of recent years have rather smacked of subterfuge, with the attempts to keep the industry going on a shoestring.

"Positive Government support should allow a compact and healthy industry of between 150,000 and 200,000 people, excluding the electronics industry; and we simply cannot afford at this critical period to be 'out on a limb,' or have little or no part in those advances in flight and space technology which will be made in the not-so-distant future.

"On the other hand, and assuming Government help, the industry must see clearly the markets ahead and cater for them, which can only be done by market research of a high order.

"It is very important to keep our world position in the aero-engine field, but this can only be done effectively with a continuing need for military aircraft and one or two officially supported civil types.

"Participation in the European Free Trade scheme offers some hope for the combined aviation industries of Western Europe, always provided the goodwill is there and funds are not wasted on the duplication of projects; and this country is certainly in the best position to act as the supplier of aero-engines to our European friends.

"To those who wish to read into the words 'full Government support' a cry for the nationalization of the industry, I would point out that the plea here is for rationalization and official support of a precious industry to keep it healthy and active. Nationalization would tend seriously to react against the foreign sales effort. In any case, there would be little object in nationalizing an industry which, unlike the basic industries, is not so very large when the enormous manhours content of its products is taken into account.

"Having pointed out in the lecture the dangers of drift, I have the uncomfortable feeling that the progress of the guided weapon and ballistic missile is suffering similarly and is in a state of dither.

"In my view, the whole business of aviation and astronautics, viewed from all (military and civil) aspects, demands the undivided attention of one specializing Ministry or authority, which is not to be expected of the present set-up as between the Ministry of Supply and the Ministry of Transport and Civil Aviation. I would suggest, therefore, the formation of a Ministry of Aviation and Astronautics, to handle everything to do with aviation and astronautics, controlled by a knowledgeable minister of cabinet rank . . .

"As I have said on a number of previous occasions, it is my firm belief that research and development budgets should cover five years rather than the present yearly period—the former span being more representative of the time factor in engine and aircraft development. But there is obviously no reason why there cannot be a yearly progress review, with re-assessment as necessary.

"To reiterate: the continual and continuing delay in making up the official mind on the future pattern of air armaments could wreck the aviation effort of this country and eventually weaken, almost to the point of death, the aircraft industry. While delay avoids the immediate spending of funds it does not lead to any saving, since it allows the competitor or adversary to gain an overwhelming lead which requires very costly effort even to draw level. The delays and hesitations of recent years have, in fact, been a horrid waste of time and money; and with military weakness comes loss of world stature and prestige."

SIR GEORGE CAYLEY MEMORIAL LECTURE

TAKING as his title *The History of the Blackburn Company*, Mr. G. E. Petty, M.I.Mech.E., F.R.Ae.S., formerly chief designer of Blackburn Aircraft, Ltd., was due to deliver the Fifth Sir George Cayley Memorial Lecture before the Brough branch of the Royal Aeronautical Society in Hull last Wednesday. Knowing that a detailed history of the company was being compiled, he talked only about the aircraft and referred to events in the expansion of the firm only so far as he thought these were necessary to bring out the background of the aircraft.

Of the T.B. twin-fuselage seaplanes Mr. Petty said that these machines were built to drop steel darts. The only thing he particularly remembered about them was that they had a wire-braced centre-section coupling up the two fuselages and due to the flexibility of the structure the relative movement between these two fuselages in flight was "quite remarkable." He went on to recall that when Robert Blackburn decided that he should have a works and an aerodrome and, if possible, a seaplane base, available as quickly as possible, he sent his old friend (and one of his original employees) Mark Swan to find a suitable spot. "Naturally he went towards the sea," said Mr. Petty, "and happened to get off at Brough, where he found everything he wanted—a river, a potential aerodrome, railway facilities and, as the story goes, two good inns."

The lecturer continued, "The result was that the first hangar and a slipway were constructed at Brough in time to erect the G.P. seaplane and carry out tests there. The tests were a bit of a nightmare. As so often appears to be the case, they were carried out in mid-winter with quite a lot of drift ice on the river. The launching was normally good, except for the poor team of waders who had to manhandle the aircraft down the slipway into the icy water, and the flight was quite successful; but getting the machine back after landing proved extremely difficult. I don't think anyone had realized the strength of the tide and the difficulty of getting the aircraft back on the slipway. . . . The wading team, led by Mr. Rhodes—'R.B.'s' brother-in-law—then works manager at Brough and later a director, were literally frozen solid and we had to carry them on planks and thaw them out by fires we had lighted in the hangar."

Later in his lecture Mr. Petty said, "The last type designed in Leeds just before the end of the war was again a Naval type called the Blackburd. It was substantially designed to operate as a torpedo plane from our only carrier, the *Argus*. I am afraid we could not have made a more ungainly looking aircraft. It was like a flying box. The only excuse was that by then production was of primary importance, and Harris Booth, who was in charge of design, eliminated all trimming; even the pilot sat in an unfaired cockpit and the trailing edges of the wings were of cord so that when doped the edges appeared to be scalloped.

"It carried a 1,800 lb torpedo and had a very complicated undercarriage. You see, in those days the deck arrester gear was non-existent and we had no wheel brakes; and so, to ensure the machine would stop on deck, it took off on wheels, then jettisoned the wheels and landed on steel skids. We tested it at Brough by taking off on the wheels, jettisoning them into the river to be picked up by motor boat and landing on skids on the aerodrome."

Of early carrier trials Mr. Petty said, "I was on the *Argus* for the first tests and the pilot—a Canadian—naturally, to be on the safe side, came in rather fast, particularly for the first few landings, so that the speed of the carrier was increased as much as possible. So much so that Gerald Boyce in the end—so he told me—had to open up to keep up with the ship . . .

"A very crude type of arrester gear had been devised consisting of fore-and-aft wire ropes supported on the deck by hinged planks. These ropes were picked up by spring-loaded hooks carried on short stub axles on the aircraft. The ropes, towards the round-down, were about fifteen inches above the deck and the height was progressively reduced along the deck to some six inches, with the idea of providing some braking effect between the wheels and the deck. They were, in reality, very inefficient as brakes, but they prevented the aircraft from going over the side of the ship. The noise on landing was fantastic, as each plank was knocked down by the advancing wheels."

Mr. Petty recalled the Perth flying-boat, which had a bow-mounted gun firing 37 mm shells. He remarked that this was quite a hefty cannon for an aircraft, and presented a number of problems connected with recoil. He went on, "We tested it by firing shells from one side of the river at Brough to the other; but instead of disappearing into the water they ricochetted off the surface and landed quite harmlessly on the other bank."

Of the Skua the lecturer said, "Our only regret was that we were not allowed to go ahead with a simplified version with fixed undercarriage, non-folding wings and the elimination of naval equipment as a first-class dive-bomber for the Air Force."

Mr. Petty concluded by saying, "It is very fitting that during the 51st year of the Blackburn company we will be laying the foundation for extensive production of an aircraft [NA.39, as depicted on page 767—Ed.] quite revolutionary in design but incorporating the wealth of experience built up throughout the previous fifty years, a large proportion of which has been spent in the service of the Navy."

Straight and Level

THERE is disagreement among airline skippers about the pros and cons of visiting the passenger cabin in flight to inquire after the welfare of the customers.

Those in favour say that this practice is good public relations. Those against scorn it as "hero walking," and say that captains should stay in their seats, even when there is not much traffic to "see and be seen" from the left-hand seat.

I would not like to enter this highly specialized discussion, except perhaps to suggest a compromise—more and better use of the passenger-address system.

● Wise words from Mr. James Pyle, a senior executive of America's new Federal Aviation Agency.

"It seems to me," he says, "that the airlines must stop spinning their wheels in attempts to process the present first-class passenger more times—he will travel anyhow and about all that can be accomplished by intensive promotion in the first-class market is to steal the passenger from one's competitor. The answer is, get into the mass transportation market by inducing a new class of travellers to take to the air."

Obvious? Judging by the pressure being put upon Mr. Pyle's colleagues in the Civil Aeronautics Board to raise fares—no. It seems to be something worth saying again and again.

● Thumbing through a 1926 copy of *Flight* the other day I found an article on Quantas. Apart from noting the spelling—it has been "Qantas" now for many years—I could not help being amused to read that "The D.H.50 has given complete satisfaction, and carries four passengers and luggage at the same running cost as the D.H.9C . . . Such is the advance of modern commercial aircraft."

● Engineers seem to be generally agreed that the right sort of end for a pressurized cylinder is a convex hemisphere. Why, then, did Vickers choose a basically concave system for the forward pressure-bulkhead of the Valiant? I understand that such an arrangement results in true tension all round the periphery, and it is certainly the most favoured configuration for the bottom of an Aerosol canister (the things which you spray to kill flies or protect chromium). Could it be that the concave end is, in fact, better, but that the convex layout is worth-while owing to the interior volume which it provides?

● Liberty of the individual is a tricky thing these days. You know the sort of thing that can get written into your contract or terms of employment—particularly if you happen to be a civil servant—to the effect that you have to obtain your employers' approval for various outside activities.

Well, someone I know recently got himself elected to the committee of a certain spare-time group. In line with regulations, he wrote a memorandum asking for formal permission to serve on this committee—a harmless enough diversion, he implied. Unfortunately the answer was no—the activities of this committee, the reply stated, might conceivably conflict with the policy of the employers.

So he had to resign from the committee of the Croydon Airport Users' Association. Just because he worked for the Ministry of Transport and Civil Aviation.

Controversies, controversies, controversies. Here they all are—symbolised in this glorious illustration of the son of the Norse god Burnt Njal "leaping high to join a battle . . ." From left to right: turboprops versus jets, independents versus Corporations, flight engineers versus pilots, Croydon versus the Minister, etc.

● "Facts, facts, facts. Every writer's basic resource is facts. Pull them from the following pages . . ."

The "following pages" thus introduced are in a new Lockheed Electra brochure, the "Electrapedia"—a fascinating example of American-style Sell, Sell, Sell.

I suppose cynics might describe the Electrapedia as a new brochuremanship-system-concept. But it is brochuremanship backed by a real aeroplane, and it has a clear purpose.

It is not glossy. It contains no fancy 68-colour lithographic art-work. It is not bound in costly vellum. It simply comprises sixty-odd typewritten pages, plus an index, plus a coloured cardboard cover. Most important of all, it contains information, however slick one may regard the Americanese in which it is presented.

So many brochure-writers appear to rate glossiness and glamour above facts and information. The result is sometimes impressive, invariably costly, and of scant use to people who buy aeroplanes (who are not influenced by glamour-brochures) and authors and journalists who can help to promote the product.

It is in the last-named respect that the Electrapedia has the sense of purpose which seems absent from so many other brochures I have so often frustratedly referred to.

● However, I cannot resist pulling Lockheed's leg the merest trifle at a section of the Electrapedia aimed at non-technical writers. Under a heading How to Use This Book, it says: "Just to make it easier for deadline-dashing writers, we've tucked a series of ready-made stories . . . at the end."

Sample extracts:—

From a pilot's viewpoint, what is it like changing from piston-engine airliners to the new Lockheed prop-jet Electra transport?

"A pleasure," according to ———, chief pilot for ——— Air Lines.

(*Insert data on local pilot's career.*)

"Prop-jet power is always right there when you need it," ——— said. "There's no waiting."

"Another thing: the Electra flies airport traffic patterns identical to piston-engine planes. But it lands shorter and gets to the ramp faster. And you can't beat it for take-off and climb."

——— said the Electra is easier to fly because turbine engines permit simplified cockpits.

(*Local pilot's remarks on "feel" of the Electra.*)

"As for actual 'driving,' it's like stepping out of a heavy truck into a new limousine with all the power assists," ——— emphasized.

● Never again will I believe that the Royal Navy is the Silent Service. It only takes two owls to land on the carrier H.M.S. *Eagle* in the Mediterranean for the Admiralty's Press department to issue two quite lyrical communiqués, the first headed by Edward Lear's lines about the owl and the pussy cat.

● Reading the news-story of the Whirlwind crew rescued by the Dutch submarine *Zeeleeuw* off the coast of Donegal, I couldn't help reflecting on the irony of the situation. Surely it is always the helicopter which does the rescuing? And who would have expected a submarine with such an onomatopoeic name to come swishing up out of the Atlantic at the crucial moment?

I was reminded of the wartime story of the R.A.F. air-sea rescue Walrus pilot who was longing to get on to fighters. Eventually he was transferred to merchant-ship Hurricanes. One day, bobbing up and down in his dinghy, he heard to his delight a rather familiar snarling drone . . .

ROGER BACON

CORRESPONDENCE

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. The names and addresses of the writers, not for publication in detail, must in all cases accompany letters.

The R.Ae.C. and Croydon

IT is most pleasing to see that the Royal Aero Club has formed a deputation to the Minister of Transport and Civil Aviation on the question of the hardship which will be caused to private fliers by the closing down of Croydon. I am sure I am speaking on behalf of all flying clubs and private fliers in this country and abroad when I wish them every success in their battle, as no doubt it will be a battle to make the Ministry realize its responsibilities towards this now small but potentially very large section of the civil aviation world. [Since this letter was written the deputation has met the Minister but apparently failed in its objective—though not for want of trying.—Ed.]

It is not true to say of the Royal Aero Club that its glories are in the past and it is now "merely a pub in Piccadilly." But it is, unfortunately, true to say that sporting and private flying, which the Aero Club was founded to support and encourage, are at a very low ebb indeed in this country, very different from the time I remember in the 1920s when we were leading the world in these branches of flying with the energetic enthusiasm of Harold Perrin, rubbing everybody up the wrong way, but getting things done.

The Royal Aero Club today is bigger and should be more powerful than it was then, and it has a very big task in front of it. It is good to see that it is beginning to tackle it.

Claygate, Surrey. NORMAN JONES.

Gilding the Hatfield Lily?

NOTICING the very creditable "splash" that you gave the Comet in *Flight* for October 24, a point comes to mind. A foreign buyer is likely to think, "No wonder they make such a fuss of the Comet's achievement—the poor old British aircraft industry has little to shout about these days."

Of course the British industry has plenty of achievements, but who could blame him for thinking that this was the only one, when almost every newspaper in the country gave the Comet headlines for at least one day and the Comet story has lasted for weeks in some daily journals? Even *Flight*, with its good news-consciousness, was still hailing the Comet two weeks after the event.

If we quietly think to ourselves, "Oh yes, it's a great achievement—but we do it all the time, y'know," we shall find other countries thinking the same.

Wembley, Middlesex. H. GINSBERG.

Airmarks versus Landmarks

I WAS mildly shaken to read on page 564 of your October 3 issue (under "Jet-Airliner Landmarks") that your Civil Aviation staff consider that "the Boeing 707 is a considerably more advanced design than the Comet 4." Even though your staff writer attempts to sugar the pill with one of those familiar Civil Service-type "on the other hand" pacifiers, admitting that the Comet possesses "a greater measure of civil development experience" than the 707, I submit that his interpretation of "advanced design" simply cannot stand up to a critical analysis when comparing two such utterly diverse design approaches to the civil jetliner. And I want to emphasize the civil aspect.

In actual fact, the Boeing 707 is a direct derivative of military jet bomber design, the B-47. Because of this unhealthy heritage the current generation of American civil jets are overloaded, underwinged and decidedly underpowered—as witness their sticky take-off performance in pursuit of the unreal estate associated with their "brochure" payload. Some of the hazardous "landmarks" are now beginning to show up in the breeding strain, very much as I intimated in these pages several years ago. As might have been visualized back on the drawing board, the podded wing-engine concept is inherently dirty as well as unsafe and must now be propped up with more aerodynamic crutches—as seen in localized leading-edge flaps and such-like bric-a-brac. These ruthless hind-sight fixes and fences will be made to work somehow, but the embroidery is going to be expensive for the operator.

It would take a minor treatise on "Why Pod-Mounted Jet Engines Make Nonsense" to demonstrate that cleanliness must always prevail over podliness, but at this advanced state of the design art one ought not to have to go through the same old lift/drag exercises to belabour the obvious. It must also be obvious that there is an optimum balance between wing and power loadings, and I am convinced that this balance has been fairly and safely struck in the Comet family line; also that it is worth trading some measure of cruise speed for the higher over-the-weather cruise altitude and much safer ground performance of the Comet 4. I am not knocking the 707 or boosting the Comet on shallow chauvinistic grounds, since engineers ought not to indulge in this kind of blind-man's-buff; I am commenting solely on the technical merit of design configuration and performance parameter—that is, on what I call the "airmarks" or aerodynamic conception. One can fool most of the people most of the time (according to the publicists!), but you cannot fool those battered air particles that have to buck out of the way of the built-in barnacles.

Your Civil Aviation experts write authoritatively and interestingly when they stick to their own expertise, but when they invade the domain of the design engineer they confuse "advanced" with "outstanding." Many designers would, I think, be interested to hear just what is so appealing about the exposed engine parasites of the podded jet and the turboprop. The shipbuilder pays out good money to scrape off such parasitic barnacles during overhaul. So why design them outside the airframe envelope in the first place? Seems downright daft to this old designer!

I do heartily agree about the landmarks. They have already appeared on the runway when the wing-engine pods strike the ground.

STANLEY H. EVANS, F.R.Ae.S., A.F.I.Ae.S.

Santa Monica, U.S.A.

Approach or Take-off?

MAY I raise a trivial point concerning your issue of October 24? On page 674 you question the accuracy of a Boeing statement that the 707 illustrated is taking off, by pointing out that the flaps appear to be fully down and that there is no exhaust smoke.

The lack of smoke adds weight to your argument, but *are* the flaps fully down? Comparison with other 707 photographs suggests that they are only half down. Also, the nosewheel doors of the aircraft are open, whereas they are closed in other photographs showing the machine either landing or on the ground, indicating that the undercarriage is on the point of retracting.

R.A.F. Wildenrath, Germany. T. C. CARBURY.

[Our correspondent is correct: the clue is to be found in the open wheel-doors. The flap position could be either "take-off" or "landing," since the angle from which the picture was taken was deceptive in this respect.—Ed.]

Now We Know

A FEW weeks ago Roger Bacon in his column "Straight and Level" idly put the question "what exactly do the Americans understand by 'weapons system?'" I can tell him, and my information comes from a very good source—namely, *Military Specification MIL-I-6051A*. Paragraph 6.2, "Definitions," says (my italics):

"6.2.1. *A 'Weapons System' is defined as* those technical and logistic elements that must be associated to provide *a* final operational, military *weapons system*. The individual system elements shall be so designed and mutually interrelated as to constitute in combination a resulting system of maximum military effectiveness."

Let's reduce all this gibberish to its simplest expression, to avoid being hypnotized by the wealth of "technical" words. Read the italicized part of the sentence. The official definition of a weapons system, boiled down to its essence, states: "A weapons system is defined as a weapons system."

No problem.

I can supply to interested readers the official American definition of when an aeroplane is stalled. It contains (one sentence) 75 words. Boiled down to its essence and pruned of the science that blinds, it states: "The aeroplane shall be considered stalled when . . . the aeroplane is stalled."

No problem.

Marignane, France. K. J. SCHMID.

The von Richthofen Book

YOUR review of *Von Richthofen and the Flying Circus* [p. 700, October 31] was doubtless curtailed by space considerations (even so it was a gem), but as it ends up by recommending the book to model-makers I would like to add a word on their behalf, about the six-view drawings. As a contributor of scale drawings of W.W.1 aircraft to model aeronautical publications, and an active model-maker for more than 25 years, I feel qualified to point out that the drawings in the book reviewed are very much open to criticism.

For example, horizontal knife-edge fuselages become pointed in rear views, cross-sections do not correspond to the elevation contours, location of some of the rigging is highly imaginative. *Without* recourse to scale and dividers more than 180 visual errors alone were counted. Mistakes in a work of this kind are inevitable and when made in good faith are, possibly, acceptable; however, such a standard is inexcusable.

Often drawings do not correspond with their descriptive text:

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Success in our business doesn't merely mean the ability to manufacture, though we are extremely well equipped, even to the extent of having our own aluminium flux bath brazing plant.

Success to us, means the ability to solve problems; to produce something that will do a new job, or perhaps an old job in never-before-experienced circumstances. And then, of course, to make it a practical and economical proposition.

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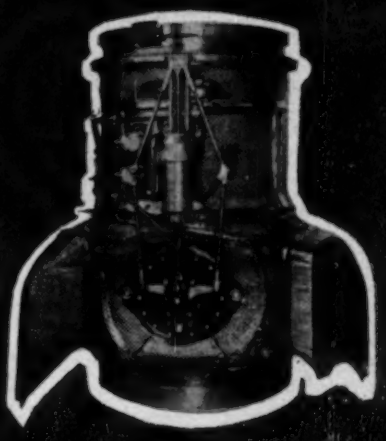
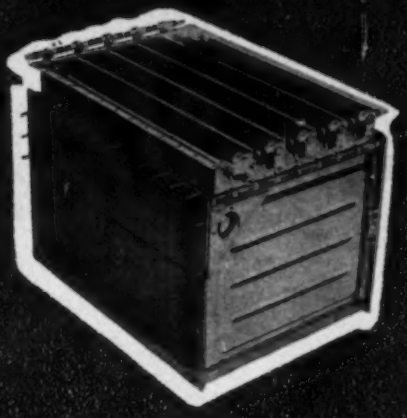


1

These thermal blankets are made of refractory fibre cased in .004 inch (.1016 mm) stainless steel. They are made-to-measure and are extremely light, the dimpled construction being responsible for their great strength. Specified for Rolls-Royce and Armstrong Siddeley jet and turbo-prop engines, these particular examples are shown fitted to the Rolls-Royce thrust reverser for the de Havilland Comet.



2

We design, manufacture and supply heat exchangers for many purposes in both aluminium alloy and stainless steel. This particular example is for the Vickers Vanguard's anti-icing system. Similar units are being supplied for the Fokker Friendship, the Bristol Britannia, the Armstrong Whitworth Argosy, the Vickers Viscount and the Handley Page Herald.

3

High pressure fuel-cooled oil cooler for high performance gas turbine engines. This unit is used in the Armstrong Siddeley Sapphire S.A.7.

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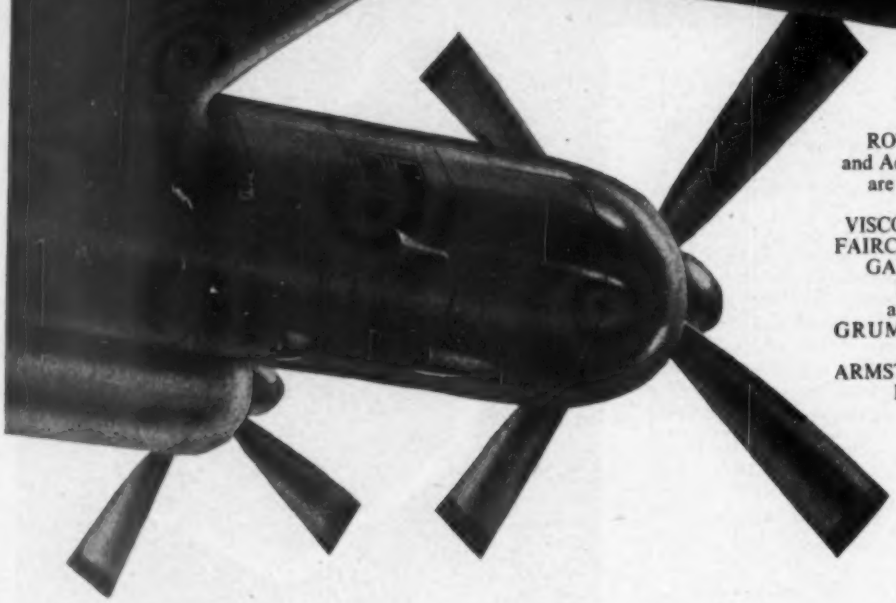

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CORRESPONDENCE . . .

e.g., the Fokker D III is correctly described as having *either* warp lateral control or balanced ailerons: the drawing shows *unbalanced* ailerons! No Fokker D VIII had anhedral on the top surfaces of the wings or such a rudder profile. The aspect ratio of the Fokker D VIII is fantastic; there should be no inverse taper at tips of the Fokker E III wings.

And so one could continue. To sum up, one feels that it would have been better to have concentrated on producing a reliable three-view of each machine instead of six very indifferent views.

Luton, Beds. P. L. GRAY.

G-AMMP?

IT was with mixed feelings that I noted in the photograph of the Comet 4 lifejacket drill (*Flight*, October 24, p. 657) the presence of an umbrella hanging from the luggage rack. Does this indicate that the all-weather properties of the modern survival apparatus are not as good as we are led to believe?

Greenford, Mddx. M. PAVITT.

IN BRIEF

Mr. Edmund J. Weiss, R.F.D.3, Purdy Hill Road, Monroe, Conn., U.S.A., is collecting biographical material on José Weiss (1859-1919) and wishes to hear from readers who have personal recollections, newspaper or magazine cuttings, photographs, letters, etc. Every care, he states, will be taken of any material loaned.

FORTHCOMING EVENTS

Nov. 18. The Photogrammetric Society: "Looking Back," by G/C. F. C. V. Laws.
Nov. 18. Institute of Transport, Metropolitan Graduate and Student Society: a.g.m. and lecture, "Movement of Passengers and Baggage before and after Flight," by J. W. Swann.
Nov. 19. Kronfeld Club: "Accidents," by A. Cdre. C. J. C. Paul.
Nov. 20. R.Ae.S.: Second Lanchester Memorial Lecture; Institution of Mechanical Engineers.
Nov. 24. R.Ae.S.: "Inertial Guidance," by J. E. Pateman.
Nov. 24. Royal Society of Arts: Cantor Lecture (1), "The Birth of the Aeroplane," by C. H. Gibbs-Smith.
Nov. 25. Guild of Air Pilots and Air Navigators: "The Jetstream," by E. Chambers.
Nov. 26. Kronfeld Club: Lecture by T. W. Brooke-Smith.
Nov. 28. Elstree Flying Club: Annual Dinner.
Nov. 28. R.Ae.S. Graduates' and Students' Section: Annual Dance.
Dec. 1. Royal Society of Arts: Cantor Lecture (2), "The Development of the Aeroplane," by Peter W. Brooks.
Dec. 3. Kronfeld Club: Lecture by Alan Yates.
Dec. 4. R.Ae.S. (Main Lecture, at Birmingham): "Freighters—a General Survey," by E. D. Keen.
Dec. 6. British Interplanetary Society: "Rocket Nozzles and Jets," by E. T. B. Smith.
Dec. 8. Royal Society of Arts: Cantor Lecture (3), "The Future of the Aeroplane," by Eric Mensforth.

R.Ae.S. Branch Fixtures (to Nov. 21): Nov. 17, *Halton*, "Flight Refuelling," by P. G. Proctor; *Henlow*, "The Objects and Methods of Aerial Survey," by J. H. Saffery. Nov. 18, *Bristol*, "Ramjets," by Dr. R. R. Jamison; *Luton*, discussion evening. Nov. 18, *Preston*, film evening; *Southampton*, "Applied Rocket Power," by M. J. Brennan. Nov. 20, *Cheltenham*, "Some Aspects of Design of the AW.650 Aircraft," by E. D. Keen. Nov. 21, *Luton*, annual dinner.

THE INDUSTRY

de Havilland Posts

EIGHT recent appointments, principally on the sales side of the organization, were announced last week by the de Havilland Aircraft Co., Ltd.

Mr. F. H. M. Lloyd, A.F.R.Ae.S., hitherto commercial sales manager and contracts manager, has been appointed sales manager. He is well known as the head of the Comet sales team and has travelled the world a great deal in recent years. Mr. J. A. Grace has been appointed commercial manager. Both he and Mr. Lloyd are responsible to the managing director, and Mr. Grace continues to be responsible for the spares department. Mr. N. G. E. Dunlop, C.A., is appointed assistant commercial manager.

Mr. J. C. Corby, O.B.E., Croix de Guerre, M.A., for nine years general manager of the Chester factory, is appointed assistant sales manager and will act as sales manager whenever Mr. Lloyd is absent. Mr. P. F. L. Hall, B.E.N.Z., F.R.Ae.S., D.F.C. and Bar, previously of the aerodynamics department, becomes technical sales manager. Mr. P. P. Hearle, as assistant to the sales manager (general duties), is responsible for Dove, Heron, Chipmunk, Beaver and Otter sales matters. Mr. H. Shaw is assistant to the sales manager (airline liaison).

Mr. P. G. Lucas, G.M., F.R.Ae.S., was appointed assistant to the managing director. He will specialize in forward outlook on the military side and liaison with Government departments.

Heavy Forging of Light Alloy

ILLUSTRATED below is the 4,000-ton direct-acting hydraulic press recently installed at the Northern Aluminium Company's Birmingham works. It greatly increases capacity for the production of hammer forgings and is also available for closed-die and no-draft forgings and for the pre-working of cast stock intended for rolling and extrusion at the Banbury and Rogerstone factories. The big machine has an interesting history. Originally installed in the Dornier works in Germany, it was confiscated by the Dutch Government at the end of the war and subsequently used by a firm at The Hague for the pressing of car body parts. Before installation at Birmingham it was rebuilt in accordance with recommendations made by the Loewy Engineering Co., Ltd. One of the principal modifications was to reduce the overall height, which was too great for the forging bay at Birmingham; the original two ram-retracting cylinders mounted on top of the press were replaced by two push-back cylinders, so reducing the height to 27ft.

Northern Aluminium's new 4,000-ton press, and undercarriage forgings for a prototype aircraft

Much of the work being handled by the press is for the aircraft industry and a number of forgings of 1,500 lb weight have been produced. Handling work of this size would be impracticable by the usual crane-and-tongs method, so a mechanical manipulator is used—essentially an hydraulically operated arm, incorporating a means of gripping the stock, and mounted on a fork-lift truck.

Custer in Canada

A NEW Canadian company, Custer Channel Wing (Canada), Ltd., of Montreal, has secured Canadian manufacturing and sales rights for Custer Channel Wing aircraft from the Custer-Frazer Corporation of New York. It plans to manufacture these aircraft in association with Noorduyn Norseman Aircraft, Ltd., Leader Products, Ltd., and Gorde Tool and Die Co. The Canadian Custer company will also produce aircraft for Custer-Frazer for sale throughout the world, and an initial order for 100 CCW-5 machines for U.S. and foreign distributors has been placed. The Custer-Frazer Corporation plans to licence several aircraft manufacturers in the U.S.A. and abroad to built their own versions of Custer aircraft for their respective markets.

Marconi Appointments

IT is announced that G. F. W. Adler, B.Sc.(Eng.), D.I.C., A.M.I.Mech.E., has been appointed chief mechanical engineer and a member of the engineering directorate of Marconi's Wireless Telegraph Co., Ltd. He has responsibility for all mechanical engineering design aspects, both of Marconi's and their associated company, Scanners, Ltd. Mr. Adler was formerly chief development engineer at the English Electric Company's Rugby works.

Other Marconi news is that the export department has been transferred from London to Chelmsford and that Mr. W. J. Richards has relinquished his position as export manager to become assistant on export matters to the general manager. Mr. A. E. Shepherd becomes manager of the export department, Mr. I. O. Mortada export sales manager and Mr. B. T. Turner assistant manager of the export department.

Coupling Developments

A NEW range of brochures has been issued by King Aircraft Corporation, of Hillington, Glasgow, for insertion in their comprehensive catalogue. A completely new product, about which information is forthcoming for the first time, is a fly-off coupling for passing a wide range of fluids to missiles or aircraft. Fully self-sealing, the coupling requires no tools for its operation and can be instantly connected and released manually. The design has been tailored to the requirements of high-pressure (1,500 lb/sq in initially) or low-pressure systems, and can handle fuels, refrigerants, lubricants and a wide range of special chemicals. An obvious

THE INDUSTRY . . .

application is the supply of fluid from a zero-length missile launcher.

In addition, King Aircraft have evolved advanced versions of the Junior and heavy-duty cam-lever toggle fasteners. All versions of these fasteners can function under severe icing conditions or in driving snow, and the width of the push-catch is sufficient for depression by an operator wearing arctic gloves. The Junior design allows for ultimate shear and tension loads of 2,000 lb and for a total adjustment of 0.25in. It is much in evidence on the upper cowling panels of the Blackburn NA.39.

Fuel Flowmeters with Integrators

AS supplied for the de Havilland Comet 4 by Negretti and Zambra, Ltd. (122 Regent Street, London, W.1), a new model of that company's Series 2 flowmeter now incorporates an integrator. Of the direct-reading cyclometer type, the latter is driven through reduction gearing by a low-inertia integrating motor operated by a 24-volt D.C. supply. The current is fed across a fine-wire rheostat of high impedance, the pick-up of which is directly linked to the flow-rate indicator shaft. As angular displacement of this shaft is linear with the flow-rate, the voltage from the rheostat is directly proportional to the flow-rate.

The tapped-off voltage is fed to the integrating motor, the shaft speed of which is proportional to the applied voltage, and rotation is imparted through the reduction gearing to the cyclometer, the reading of which should therefore be a true integration of flow-rate with time. The maximum reading is 100,000 kg of fuel in intervals of 10 kg.

New Flexible Pipe-Couplings

KNOWN as ACFlex pipe couplings, a new range of fittings has been produced by Aero Controls, Ltd., of Weedon Road, Northampton, for converting rigid tubes into flexible assemblies. Suitable for fuel, hydraulic, pneumatic and lubricating oil lines, they will accommodate tube misalignments of up to 1/16in and separations of up to ¼in, and will allow plus or minus 4 deg tube flexure.

In such circumstances these fittings eliminate the necessity for metal bellows in pipe runs and, as they can be installed after tubes are in place, structural apertures need be no larger than the standard bead on the tube. Since an axial movement of 0.35in is permissible, the fittings can function as slip joints. It is stated that little more than hand tightening is required to achieve pressure tightness.

Design data include: pressures, −11 to +125 lb/sq in (working), +250 lb/sq in (proof) and +375 lb/sq in (bursting); temperatures, −50 deg C to +70 deg C. It is stated that the new coupling embodies design features already extensively used on military and commercial aircraft, engines, and missiles. A wide range of sizes and fittings is offered.

IN BRIEF

Keelavite Hydraulics, Ltd. (until recently Keelavite Rotary Pumps and Motors, Ltd.) announce the appointment of Mr. N. B. Brooks, M.C., to their Board of directors.

* * *

A booklet describing and illustrating the varied uses of Fibreglass in the aircraft industry has been published by Fibreglass, Ltd., Ravenhead, St. Helens, Lancs.

* * *

Aeroweb honeycomb design information sheets, for retention in a loose-leaf binder, have recently been brought up to date by CIBA (A.R.L.), Ltd., Duxford, Cambs.

* * *

An illustrated booklet, *Scientific Seating*, describes the range of adjustable seats designed and manufactured by Fairey Marine, Ltd., Hamble, Hants, for military, industrial and scientific purposes.

* * *

A new factory for the manufacture of oxygen and dissolved acetylene has been opened by British Oxygen Gases, Ltd., on the Raynesway Industrial Estate at Derby. The company now has 46 oxygen producing and compressing centres and 20 for dissolved acetylene.

* * *

Commenting on the photograph (page 668, *Flight*, October 24) of the G.E.C. galley installed in B.O.A.C. Comet 4s, Lec Refrigeration, Ltd., of Bognor Regis, Sussex, remark that a prominent feature of the equipment is the two-temperature refrigerator. They add that they were solely responsible for design, development and manufacture of these refrigerators for B.O.A.C. Comets and Britannias.

* * *

Technical and operating details of agricultural-work equipment built by Rural Aviation, Ltd., P.O. Box 369, New Plymouth, New Zealand, and fitted to (or used with) Cessna aircraft are contained in a new brochure, *Cessna at Work*, issued by the company. Items include top-dressing hopper, aircraft tractor loader, spraying installation (including spray loader), supply-dropping equipment and long-range fuel system.

* * *

A comprehensive illustrated brochure on the development and performance of electrical actuators has been published by the Plessey Co., Ltd. Entitled *Electrical Actuation*, it contains more than 250 photographs, installation drawings, wiring diagrams and performance curves, together with a detailed specification of each unit; and in addition to describing units already used in aircraft and other applications, it gives details of other units not yet in general use.

* * *

Four specialist regional technical sales engineers have been appointed by Winston Electronics, Ltd., Shepperton, Middx. Mr. K. P. Reynolds, based on Manchester, covers Cheshire, Lancashire, Yorkshire and the North; Mr. P. Reeves will be responsible from Birmingham for Derbyshire, Leicestershire, Lincolnshire, Northamptonshire, Nottinghamshire, Rutland, Shropshire, Staffordshire and Worcestershire; Mr. V. Diederichs will cover London south of the Thames, Berkshire, Dorset, Gloucestershire, Hampshire, Kent, Oxfordshire, Surrey, Sussex and Wiltshire; and Mr. D. A. Jamison the London area north of the Thames, Bedfordshire, Buckinghamshire, Cambridgeshire, Hertfordshire and Middlesex.

Mr. J. N. Toothill, C.B.E., F.C.W.A., Comp.I.E.E., Comp.Brit.I.R.E., F.R.S.E., who, as briefly recorded in our pages last week, has been made a director of Ferranti, Ltd. Closely associated with the company's activities in the electronics field, he was appointed general manager of their Edinburgh factory in 1942, a position he still holds. He is a governor of the College of Aeronautics and a member of the Scottish Civil Aviation Advisory Council and of the S.B.A.C.'s equipment group committee

* * *

A four-page leaflet giving summarized data on Pullin-Kearfott and Pullin servo components and instrument motors has been published by R. B. Pullin and Co., Ltd., Phoenix Works, Great West Road, Brentford, Middx.

* * *

The Universal truck made by Hunter (London), Ltd., of 80 Fenchurch Street, E.C.3, has been modified to carry all types of industrial X-ray equipment. It permits an X-ray machine to be pointed in any direction.

* * *

Flexibox, Ltd., have appointed John Turner and Co., 25 Collingwood Street, Newcastle-on-Tyne, 1, as agents for the north-eastern area of Great Britain. The company also announces that Mr. G. L. Towers, B.Sc., joined them on September 1 as sales engineer. He will be based in Birmingham.

* * *

Mr. Arthur Griffiths, O.B.E., M.I.P.E., has been appointed group managing director of Sterling Industries, Ltd. The company controls Dualloys, Ltd., Sintered Metal Components, Ltd., the Sterling Instrument Co., Ltd., all of Chard, and Exactor, Ltd., of Edgware, Middlesex.

* * *

Christmas presents, both personal and—on a larger scale, in the business world—are now a matter of urgent consideration. In this connection The House of State Express, 210 Piccadilly, London, W.1, publish a list of their many and varied presentation packings (which include English pewter tankards) of State Express cigarettes and of various cigars.

* * *

A new adhesive tape with adhesive on both sides has been developed by Evode, Ltd., Common Road, Stafford. Called Twinstik, it consists of a thin tissue impregnated with a special pressure-sensitive adhesive and protected by a treated paper. It is available in a variety of widths up to 12in and can be applied to most surfaces.

SERVICE AVIATION

Royal Air Forces and Naval Flying News

C-119 Fairchild Boxcars of Nos. 435 and 436 Sqns., R.C.A.F. Air Transport Command, at Crumlin Airport near London, Ontario, during the recent Canadian Army-Air Force mobility exercise "Globe Trotter One"

Air Council Appointment

SINCE September 1956 Commander-in-Chief, M.E.A.F., Air Marshal Sir Hubert L. Patch has been appointed Air Member for Personnel with effect from April 1 next year.

Before going to the Middle East he was A.O.C-in C. Fighter Command, and prior to that A.O.C. No. 11 (Fighter) Group from 1953 to 1955. He was three times mentioned in dispatches during the war, when his appointments included that of Director of Armament Requirements at Air Ministry in 1943, and A.O.C. No. 44 (Transport) Group the following year.

Command Changes

FURTHER changes in the organization of the non-operational commands of the R.A.F. were announced by the Secretary of State for Air, Mr. George Ward, in a written Parliamentary answer on November 3.

Home Command and its two remaining Group headquarters are to be abolished, and the reorganization will be completed during the present financial year. It is estimated that this will save about 670 Service and 300 civilian posts and that the long-term financial saving will amount to over £¼m a year.

Control of the A.T.C. and of the R.A.F. section of the C.C.F. will pass to Flying Training Command, whose A.O.C-in-C. (at present Air Marshal Sir Richard Atcherley) is to assume the additional title of Commandant of the Air Training Corps. An air commodore will be appointed as full-time Deputy Commandant.

The second change announced by Mr. Ward was that Headquarters, No. 90 Signals Group, is henceforth to be known as Signals Command. "The term 'Group' no longer represents the functions of this headquarters," stated the Air Minister. "An Air Force with increased flexibility and mobility demands ever better communications, navigational aids and radar."

F/O. B. A. Nice, who is in command of No. 12 Air Experience Flight at Turnhouse, with his first "customer," A.T.C. Cdt. W. Daisley. The flight was recently inaugurated by A.V-M. A. D. Selway on his first official engagement as the new A.O.C. No. 18 Group

A. Cdre. T. W. Piper, Director of Operational Requirements at Air Ministry (right), with Mr. R. E. Harvey, joint deputy managing director and general manager of Short Brothers (centre), and Rear Admiral A. S. Bolt, Deputy Controller of Aircraft at the Ministry of Supply, at Queen's Island recently when the visitors inspected Britannia 253 and Canberra PR.9 production and saw the SC.1

Queen's Honorary Surgeon

IT was announced last week that the Queen had approved the appointment of A. Cdre. G. H. Morley as an Honorary Surgeon to Her Majesty (with effect from September 3) in succession to A. Cdre. D. A. Wilson, on the latter's retirement from the R.A.F.

A. Cdre. Morley is the R.A.F. Consultant in Plastic Surgery. During the war he was seconded to the Queen Victoria Hospital, East Grinstead, where he studied the treatment of burns and their associated plastic surgery under Mr. (now Sir) Archibald McIndoe. Later he spent four years at the R.A.F. Hospital, Ely, in charge of the surgical division, where his work was mainly in the burns centre. He is at present in charge of the 60-bed R.A.F. Plastic Surgery and Jaws Injury Centre at Halton, the leading Service department of its kind in the country.

Precision Operation

DURING the five-day airlift of over 2,000 Army and R.A.F. personnel from Amman to Cyprus, the force of eight Beverleys from Transport Command and Hastings of No. 70 Sqn. carried out ninety round flights, a total of 310 flying hours. In addition to their passengers, they flew out 223 vehicles and eight tons of stores, equipment, guns and ammunition; and between them the aircraft covered a total of 58,000 miles, using a ten-mile-wide corridor over the Lebanon and Syria which was under the supervision of U.N. officials.

All planned sorties during the airlift were accomplished on time, the greatest deviation from an E.T.A. at Amman being two minutes and by far the greater proportion of the aircraft keeping exactly to schedule. An Air Ministry correspondent who was at Amman during the operation reported that no hitches of any description marred it, and that "as a spectacle of precision flying alone" it had "no parallel since the Berlin airlift."

Commonwealth Posts

TWO R.A.F. officers have recently taken up appointments with the Pakistan and Ceylon Air Forces. G/C. C. B. E. Burt-Andrews has become the first Commandant of the new Pakistan Air Force Staff College (to be opened shortly at Drigh Road, Karachi) and G/C. J. L. Barker has been appointed Commander of the Royal Ceylon Air Force. Both appointments carry the acting rank of air commodore.

A. Cdre. Burt-Andrews has been head of the Far East Defence Secretariat at Singapore since 1955, having previously been on the directing staff of the R.A.F. Staff College at Bracknell and prior to that (from July 1951 to February 1953) Secretary-General, AAFCE. He is an expert linguist, speaking French, Bulgarian, Serbian, Russian and Italian.

A. Cdre. Barker, whose previous appointment was that of Air Attaché in Rome (since 1956), commanded No. 241 Sqn. in North Africa and No. 625 Sqn. in the U.K. during the war. He is a C.B.E. and holds the D.F.C.

CIVIL AVIATION

The Independents 1957-58

LAST Wednesday, November 12, the British Independent Air Transport Association was due to hold its annual meeting for the year which ended on June 30, 1958. Here is a review of the annual report

THE most encouraging aspect of B.I.A.T.A.'s 1957-58 traffic results is that traffic increased in most spheres of operation, and the slump of 1956-57—evident from the graphs—was left behind.

The B.I.A.T.A. independent airlines accounted last year for about 25 per cent of British air transport production in terms of capacity short-ton statute-miles flown. In terms of actual load ton-miles carried, the independents' share was 28 per cent.

The two graphs have been prepared by *Flight* in order to show at a glance the proportions of each class of independent business. Unfortunately it is not possible to show the 1957-58 distribution—with the exception of inclusive tours—but the general proportions are similar to those of 1956-57.

The accompanying tables show, in as much detail as the sparse B.I.A.T.A. statistics permit, the breakdown of all results, scheduled and non-scheduled. As in previous years, no financial figures are available, though it is probable that total independent revenues were of the order of £20 millions—about one-fifth of the amount earned by all British air transport.

In a preface to the report, the Chairman, Mr. T. W. Morton, points out that the report is for the year ending in June; and that the 1958 summer season had not been as satisfactory as was hoped. "The emphasis must obviously be on recovery," he notes, "and the resumption of full-scale expansion. This will not be easy and a great deal must depend on faith, without which it would be pointless to continue." The chairman makes a discreet reference to the problem which is uppermost in the minds of all British private operators—the barrier to expansion presented by the scheduled-services monopoly of the Airways Corporations:

"It is believed that a liberal and far-seeing outlook would result in the establishment of a greater market in which the independent airlines—and the Airways Corporations—could all progress. The Association recognizes that some form of control is inevitable, but it considers that licensing arrangements to perform this function should be such that issues might be considered on their merits, and against the background of the needs of the industry and its future, rather than on some predetermined criteria which have no place in a changing industry."

The "predetermined criteria" are, we feel, the terms of the Air Corporation Act which reserve the right of B.O.A.C. and B.E.A. to scheduled services—except those which are operated "in association with" the Corporations. The word "association" has now been stretched to the point where both Corporations are complaining of diversion of traffic. Sooner or later, if the independents are to increase their contribution to British air transport, the monopoly powers of the Corporations must be modified by Parliament. Whether or not this happens will probably depend upon the results of the next general election.

In the meantime, however, the independents' scheduled business—which almost by definition means the business on which a sound industry can be based—increased by 14 per cent, or at about the 1957-58 average for the world. In common, too, with world experience, the overall load-factor fell sharply, from 62.2 per cent to 59.9 per cent. The Association draws attention to the low density of many scheduled routes, and refers to "restrictions" by foreign governments. This is a reference to the fact that, in international operations, the independents do not enjoy the government backing conferred by participation in bilaterals.

The strongest words in the report appears under the heading "Colonial Coach Services."

"The Government has decided that B.O.A.C. may introduce a similar type of service on the routes in question and that the independent companies concerned will be permitted to continue, but only with frequencies and capacity so strictly limited that the services will be virtually impossible to operate.

"It is to be earnestly hoped that the Government, in whose hands the decision finally lies, will reconsider the matter before it is too late and see to it that operational restrictions will not be imposed . . ."

Inclusive tours, about which the greatest controversy is at the moment raging, are not referred to in such robust terms. The report notes the rate of increase—and appreciates the fact that approvals may in future be for periods longer than the one-year usually approved hitherto. No mention is made of the B.E.A. move (see last week's issue, and also page 783) to offer new inclusive-tour rates on their scheduled services.

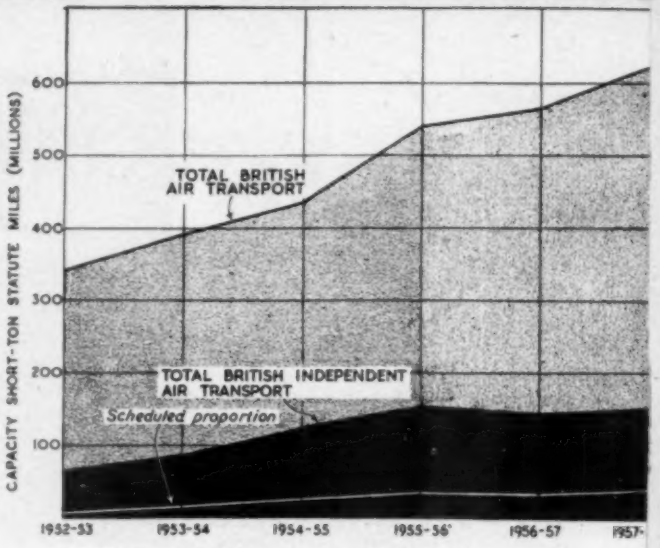
Points from the report: (1) Freight ton-miles went up 80 per cent, mainly thanks to Government contracts to the Far East. (2) On domestic scheduled services heavy fare increases which were "imposed" depressed traffic. (3) New Britannias will help trooping requirements, but their small numbers will result in inflexibility of application. (4) Transport can only be provided at the lowest cost by "steady and regularized procurement," and not by erratic or uneconomic mass-buying. (5) Close working relations with the Corporations exist, but "more could be achieved in this respect." (6) New aircraft on order at June 1958: 3 Britannia 253 (via M.o.S.); Hunting-Clan, 2 Britannia, 2 DC-6A (now delivered) and 3 Viscount 810; Air Charter, 1 Britannia; Eagle, 2 DC-6A/B (delivered); Airwork, 2 Viscount 810.

Scheduled Operations

	1956-57	Percentage Change	1957-58	Percentage Change
Capacity ton-miles ...	35,238,000	− 5	41,882,000	+20
Load ton-miles	21,934,000	+ 2	25,051,000	+14
Overall load factor ...	62.2%		59.9%	
Passengers carried ...	690,859	+ 22	776,364	+12
Passenger-miles	163,231,000	+ 27	178,979,000	+10
Freight (short tons) ...	68,972	− 18	86,656	+26
Freight ton-miles	6,944,000	− 33	8,569,000	+23
Mail (short tons)	70	+ 70	44	−37
Mail ton-miles	51,000	+ 30	33,000	−35
Inclusive Tours (not included in the above)				
Capacity ton-miles ...	7,469,000	+110	10,772,000	+44
Passengers	108,434	+108	144,878	+34
Passenger-miles	67,021,000	+111	97,362,000	+45

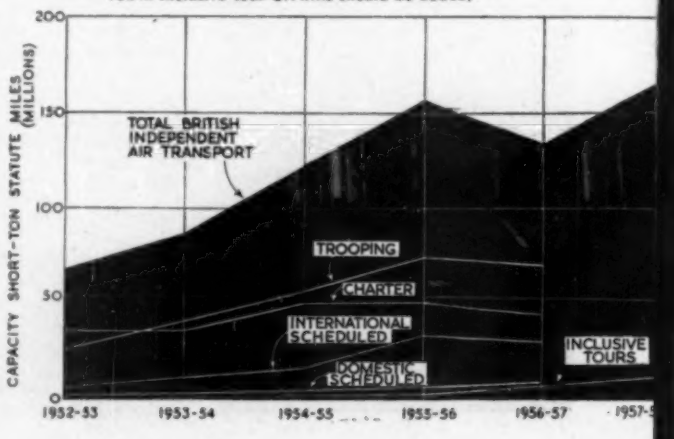
Non-scheduled Operations

		1956-57	Percentage Change	1957-58	Percentage Change
Capacity ton-miles ...		111,656,000	− 5	111,448,000	−
Load ton-miles		89,024,000	−	94,050,500	+ 6
Passengers carried:	Civil	322,538	+ 24	307,692	− 4
	Milit.	157,035	− 22	137,821	−12
	Total	479,573	+ 4	445,513	− 7
Passenger miles:	Civil	144,044,000	+ 13	112,274,000	−22
	Milit.	516,302,000	—	729,271,000	+41
	Total	660,346,000	+ 2	841,545,000	+27
Freight (short tons) ...		54,895	+ 24	30,030	−45
Freight ton-miles		29,980,000	−	54,547,000	+80



The growth of British air transport, 1952-58

Growth of the independents, 1952-58. (The 56-57 dip is exaggerated: 10.7m inclusive-tour C.T.M.s should be added)



'Oleo-pneumatics knock me cold . . .

let's get back to operating figures'

When the airline accountant gets technical, he prefers to talk in terms of capital costs, air mile costs, seat mile costs, and profit margins.

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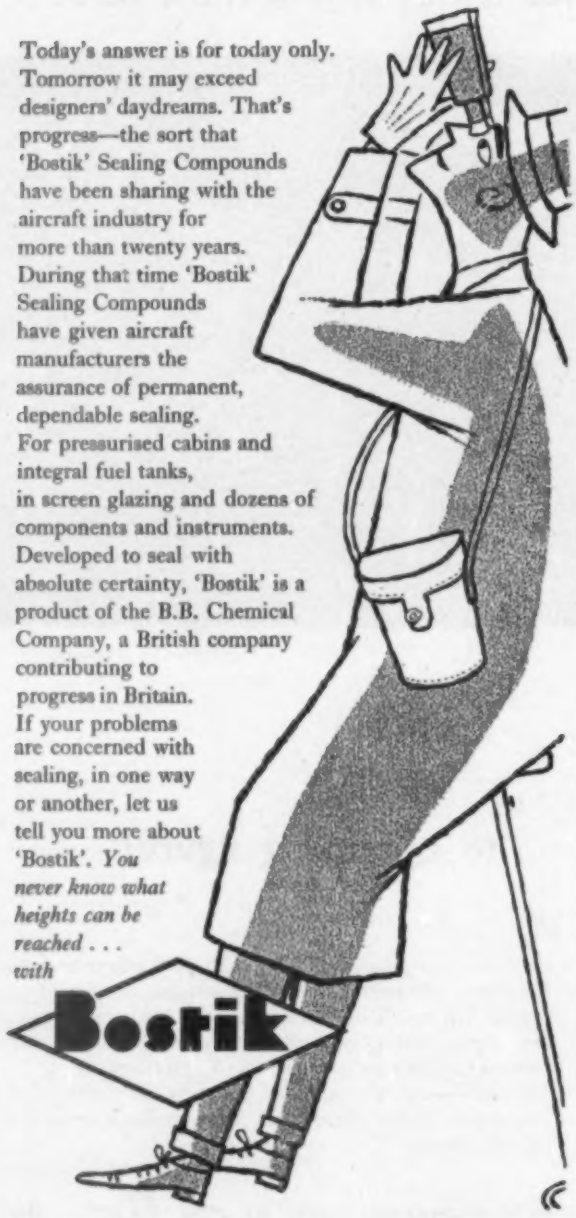

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PAL 10

CIVIL AVIATION . . .

THE B.O.A.C. INQUIRY

THE court of inquiry into the "causes and circumstances" of the recent dispute between B.O.A.C. and the Corporation's engineering workers took place at Church House, Westminster, between October 22 and November 3. The inquiry had been ordered by Mr. Iain Macleod, Minister of Labour, on October 18. Its chairman was Prof. D. T. Jack, Professor of Economics at Durham University, who was assisted by Mr. Norman Longley, past president, National Federation of Building Trades Employers, and by Mr. W. J. P. Webber, general secretary, Transport Salaried Staffs Association. The whole of the day-by-day evidence is summarized in the following notes. It is not yet possible to say when the findings will be published

THE first session of the inquiry (Wednesday, October 22) was confined, at the chairman's direction, to opening statements by the principal spokesmen for each side.

MR. E. J. RISTOW (for the employers' side of the National Joint Council for Civil Air Transport) said that on September 17 the employers replied to a wage claim submitted on June 3. They made an offer of an increase, to be effective from September 21. The trades union side had replied that it would want another meeting before taking a final decision; the meeting was adjourned until October 7. Within "a few days" both B.O.A.C. and B.E.A. were informed that a ban on overtime would be instituted in view of the inadequacy of the pay offer.

On September 20 the employers' side of the N.J.C. told the trades union side that the proposed action was unconstitutional. "The employers had then to decide whether to go on discussing the wage claim while the overtime ban was in operation." After private talks, discussions were resumed on October 8, and a pay increase was offered, ranging between 5s 6d and 7s 4d a week according to grade. This was rejected. The trades union side said it was prepared to accept increases from 7s 4d to 9s 2d, and wanted these increases back-dated to September 21. This was refused, and on October 9 the overtime ban was reimposed.

By the evening of October 13 it became clear that if schedules were to be maintained there would have to be overtime. Volunteers were asked for but were not forthcoming: "Some of the staff had been sent for by the works manager to give them the opportunity of reconsidering their refusal, but they had still refused and had been told that if, when the shift ended and overtime became workable, they were found not to be working, then they would be dismissed." As a result of this the whole of the hourly-rated engineering staff went on strike, though no employees had actually been dismissed.

MR. E. ROBERTS, for the trades union side of the N.J.C., said that delays always seemed to occur in dealing with wage claims: "On occasions we feel that there is, to put it mildly, evasion." The trades-union case was that the ban on overtime and the final dispute were due to the delaying tactics of the employers, especially over wages applications. Mr. Roberts said that at the meeting at the Ministry of Labour on October 17 the trades union side had one hour with the Ministry, the rest of the 15 hours being taken up by the employers. "These long periods of waiting do not improve tempers."

Evidence of Dismissals

Friday, October 24. MR. GEORGE SCOTT, chairman of the trades union side of the N.J.C., said that the wage claim had been put in last May; it was not until September 17 that the employers replied with a small offer which they (the employers) considered "unjustified." There had been conjecture about the dismissed men. The union had been unwilling to publish the names of those concerned "primarily because it was realized that this would lead to persecution by the Press." Mr. Scott described how timekeepers and secretaries had been kept working late on October 13 for, it seemed, the intention of sacking anyone who refused to work overtime.

It was discovered on the morning of October 23, when the time cards had been reissued, that a number of erasures, changes and alterations had been made on them. "I have here a list of the members whose clock cards have been altered and also the names of the supervisors and timekeepers who would not normally have been at work but who were present on October 13 for the purpose of making up the cards of the members dismissed. I have also . . . photographic copies of the time-cards giving indisputable evidence that the men who were named on these cards were indeed sacked."

Mr. Scott then put on record the fact that the union side had advised the management that the ban on overtime would not apply to the Comet 4—"evidence of the workmen's desire not to damage the prestige of a publicly owned airway." Similarly, even during the strike itself, men had run up Comet 4 engines to prevent their deterioration. The management had been well aware that, in making the provocative request for overtime in the atmosphere prevailing, they were inviting the action which followed. He submitted that a dispute was known to exist and that the Corporation did nothing to resolve it, ignoring the official machinery of negotiation and exacerbating the position.

MR. HAROLD SPEAR, chief personnel officer of B.O.A.C., said that the incident which precipitated the strike was action taken by the Corporation in exercising its "contractual right" to require staff to work overtime when operating conditions necessitated it. In B.O.A.C.'s view, the problem was simply that the employees had "ceased to recognize the sanctity of their individual contracts of service and also ceased to recognize the necessity of supporting their union officers in honouring agreements these officers have signed on their behalf."

MR. C. HERRING, personnel director of B.E.A., said that the number of unconstitutional actions taken by B.E.A. employees had been steadily increasing since 1947. He submitted an appendix listing these actions. Although there was a great volume of loyalty, there seemed to be a group which had attempted to persuade others to adopt unconstitutional action.

MR. A. M. BLAKEMORE, secretary of B.I.A.T.A., gave it as his opinion that unofficial action was bedevilling the negotiating machinery. Independent operators as a result had doubts as to the value of the N.J.C. and all it stood for.

SIR GERARD D'ERLANGER, chairman of B.O.A.C., said that he was quite willing to cancel his departure for Delhi the next day [to attend the I.A.T.A. annual meeting]. Sir Gerard was asked by the court whether he was aware of the proposal by the trades-union side of the N.J.C. to attend a special meeting on October 15. Did he think any advantage would have been gained if he and Lord Douglas [who had been asked also] had attended?—Sir Gerard said that he and Lord Douglas had consulted on the telephone and concluded that it would not, in fact, have been "proper" for them to intervene.

In what circumstances would Sir Gerard think it necessary to intervene in proceedings of that kind? Never?—Sir Gerard hoped that he had not given the impression that he had thought it unnecessary to attend; he had not thought it proper. "I wouldn't say never. For instance, the next morning I received an unofficial deputation from the trades union side."

B.O.A.C.'s "Part-time Chairman"

MR. CLIVE JENKINS, representing the Association of Supervisory Staffs, Executives and Technicians (A.S.S.E.T.), said it would be grossly unfair to suggest that B.O.A.C. personnel were deliberate procrastinators. He suggested that B.O.A.C. had an incomparably better record in honest negotiating than B.E.A.

Mr. Jenkins said that members of A.S.S.E.T. believed it was the intention of the Government progressively to divert traffic away "from the Corporation and into privately owned profit-making airlines." His members had viewed with some concern the appointment of the present chairman, Sir Gerard d'Erlanger. During his term of office with B.E.A. he did not get along with the unions. His appointment had been complicated by its part-time nature and also by the presence of a civil servant as full time deputy chairman.

"The curious split management control at the top, has in our view, led to some of the friction and difficulties."

MR. D. G. LAMB, representing the Radio Officers Association, said: "We have on more than one occasion protested against the delay and vacillation, the result of which has been ever-increasing frustration and lowering of morale."

MR. J. GREGORY, of the Merchant Navy and Airline Officers' Association, said that there were invariably "tedious and frustrating delays" affecting settlements. There was a substantial section of his association's members who had concluded that the only way to get something done reasonably quickly was to "adopt a threatening attitude."

Wednesday, October 29. MR. JIM MATTHEWS, secretary of the trades-union side of the National Joint Council, said that relations between B.O.A.C. management and staff today were "at their lowest ebb." The deterioration could be traced back to the departure of Sir Miles Thomas [chairman of B.O.A.C. until May, 1956]. "From the moment of his appointment our former chairman expressed his dynamic personality upon his staff . . . the appointment of a part-time chairman was a serious blow to morale."

In an atmosphere of uncertainty the management had suddenly allowed information to reach the Press of a "startling redundancy," and this had plunged morale steeply. Mr. Matthews thought that the chairman and managing director should be developed into "a real personality" known by, and familiar to, all grades of staff, so that he became "Mr. B.O.A.C."

He suggested that the root cause of many breaches of the constitution had been due to the machinations of a "certain element." People making that allegation "could have gone a little further and identified this element as the Communist Party cell which has been set up at London Airport." He quoted seven instructions issued by the Communist Party, which included the short-circuiting of negotiations and the forcing of employees to settle questions on the spot under threat of strike. "I want to see this great mass of British workers . . . rid themselves of this cancer in their midst."

MR. E. J. RISTOW, giving further evidence, said that much had been made of the question "were five men sacked?" The question was largely academic; it was the clear intention of the management to dismiss the men if they failed to do the overtime required of them. The unions had appeared to regard civil air transport as having an inexhaustible financial reserve, failing to appreciate that additional costs had to be carefully controlled.

Friday, October 31. MR. J. E. STEVENSON, for the Aeronautical Engineers Association, said that the efforts of B.O.A.C.'s management to create a more or less "captive union machine" had created conditions in which the influence of the Communist Party had flourished.

MR. R. T. SILVERTHORN, for the Association of Engineering and Shipbuilding Draughtsmen, spoke of "inexcusable delays" in the settlement of justifiable grievances which exasperated the most patient and loyal employees. Of Mr. Matthews he said: "His abusive and provocative remarks were more appropriate to a regimental sergeant major than to a democratic trades-union official."

MR. IAN MIKARDO, a member of the N.J.C. since its inception, said that the cause of the deterioration dated from the reorganization of the B.O.A.C. Board two years ago. All the workers knew "that the newly appointed chairman [Sir Gerard d'Erlanger] had had a career in

CIVIL AVIATION . . .

The B.O.A.C. Inquiry (continued) . . .

B.E.A. and that during the course of his regime there had been such a comedy of errors that perhaps the most charitable thing I could do is to draw a veil over it." They knew that since leaving B.E.A. his activities in aviation had been such as to benefit some of B.O.A.C.'s competitors. Worse still, the fact that he was only part-time and that his deputy [Sir George Cribbett] was a "somewhat cloistered civil servant" seem to suggest an almost "dilettante approach" to B.O.A.C.'s problems. Mr. Basil Smallpeice's appointment as managing director had been warmly approved not only for his high qualities but because the appointment had been made from within.

Under the present chairman, relations in the Corporation, and especially consultation with the unions, had become a subject for lip service rather than a serious part of management duties.

Mr. Mikardo went on to say that Mr. Matthews had spoken of the workers as "a lot of mugs" and "a lot of proper Charlies who were easy dupes of a handful of Communists." These workers were in fact an industrial élite. They were paid more than workers in many other industries because their technical level and level of intelligence was higher. They were not a bunch of illiterate navvies. They were men who thought things out for themselves, who had the interest and welfare of their Corporation at heart, and who resented any threat from without the Corporation or from inefficient management within.

Mr. Mikardo thought that a further cause of deterioration in relations was that Mr. Matthews had "diverted attention from the real troubles by his feverish one-man crusade against the Communists on the Airport." I am sure their numbers are small and would be smaller still if Mr. Matthews did not give them so much free publicity and such opportunity to pretend to be persecuted underdogs."

Communist Activity

MR. SIDNEY MAITLAND, chairman of the Joint Shop Stewards Committee at London Airport, described himself as, "Like most intelligent adults, a member of a perfectly legal and constitutional political party. No grim, dark, tucked-away secret is being revealed. It is a perfectly well known fact that I am a member of the Communist Party."

He had, he said, been employed at London Airport since September, 1950 and his present trade-union offices at the airport included chairmanship of the joint shop stewards' committee; of the engineering and maintenance panel, B.O.A.C.; and of the local joint panel, trades-union side, London Airport. In addition he was chairman and main spokesman for the extremely wide consultative committee set up in B.O.A.C. to deal with the problems of reorganization arising from the conclusions of the B.O.A.C. committee enquiring into engineering costs.

He continued: "Our members are among the best individual and highly technical work people in the country . . . When Mr. Matthews referred to unruly members he meant members he could not rule. They like to have a say, and an important say, in any decision made and are not prepared to be dictated to by Mr. Matthews or by anyone else."

Mr. Matthews had thought it significant that B.O.A.C.'s headquarters building was nicknamed the Kremlin: in fact it was more commonly known as the Big House and Alcatraz. Alcatraz, as the Court were aware, was the well known American prison, and the Big House was a slang expression derived from Hollywood prison films. The nickname of the Kremlin was not an indication that it was a bastion of Communism but of its fortress-like character, its poor ventilation, lack of fresh air and lack of windows.

Mr. Maitland maintained that the workers' willingness to work on the Comet 4 was not the action of the trades union spoiling for a fight: "There must be few records indeed in which intense dissatisfaction exists over a wage claim where the employer has refused to make a single concession to meet the viewpoint of the trade union side, where the claim has been outstanding for nearly four months, where the employers, earlier in the year, had talked in terms of massive redundancy and where the workpeople decided to work voluntarily during the night, without payment, so that a new service can be introduced."

In conclusion Mr. Maitland said: "I am advised that I ought to inform you that proceedings have been commenced against me in connection with the events into which this court is inquiring. The claim is for damages and a writ has been served on me. These proceedings are being defended."

A member of the panel, Mr. Webber, inquired of Mr. Maitland how he reconciled his obligations to serve the constitutional procedure of the industry with the chairmanship of a committee which had ignored them. Mr. Maitland at first said he did not understand the question, but finally answered: "Constitutions are not the last word. Sometimes employers provoke situations which make it necessary to take action outside the constitution."

SIR GEORGE CRIBBETT, deputy chairman of B.O.A.C., intervened to say: "I would not like these criticisms [Mr. Mikardo's reference to the "dilettante" nature of B.O.A.C.'s management] to pass without comment." Sir Gerard was returning from Delhi and he, Sir George, thought it would be better if the reply could be left over until Sir Gerard returned.

Monday, November 3. SIR GERARD D'ERLANGER, chairman of B.O.A.C., put three problems to the court: (1) How was B.O.A.C.'s economy and efficiency to be improved, involving redundancies in some quarters, without further strife and disruption? (2) How could the multiplicity of trade unions be reconciled with the relatively small number of people engaged in the industry? (3) How could they reconcile the merits and claims of those who belonged to unions accredited to the national joint councils, and those who did not?

Before he had been appointed chairman it had been clear to him that B.O.A.C.'s efficiency needed a complete overhaul. For far too long the Corporation's profit-and-loss account had been "balanced on a knife-edge." Having to take remedial action was bound to be unpopular, but it was inevitable. Over the past years the Board had made concessions over and over again, but obviously these had failed. It had now become necessary to take a firm stand and to ensure that the proper responsibilities of the N.J.C. were accepted.

Sir Gerard considered that a whole-time chairman and a whole-time managing director were bound to get in each other's way. He had never believed it was right in an organization like B.O.A.C. to combine the functions of chairman and chief executive. From his experience in the B.O.A.C. team in 1940-45 and as chief executive and chairman of B.E.A. in 1945-49 he was convinced the chairman should have other interests to keep him in touch with affairs outside the Corporation, thus broadening his knowledge and experience.

"I would like to mention how much I deplore Mr. Mikardo's mischievous statement concerning Sir George Cribbett. Sir George is a man who has devoted a considerable portion of his life to the furtherance of British air transport. His advice on all matters connected with the industry is invaluable, his knowledge of its international complexity is unequalled, and his application to his task is unquestionable."

MR. BASIL SMALLPEICE, managing director of B.O.A.C., described as "wholly mischievous and false" the allegation that the future employment of workers had been prejudiced by the appointments to the Board made in May, 1956. The real cause was the impending re-organization of the engineering department. He went on to explain that an engineering costs committee had ascertained from comparable airlines that they were able to get the same amount and quality of engineering work as B.O.A.C. with nearly 50 per cent less engineering staff. "Unless we are as efficient as our competitors," he continued, "we shall never be able to expand and develop new routes in the way that Parliament and the country will expect of us, nor shall we be able to take full advantage of the new aircraft we have ordered.

THE NATIONAL JOINT COUNCIL FOR CIVIL AIR TRANSPORT

Extract from the N.J.C.'s constitution: "The employers on the one hand and the employees on the other hand undertake that no lockout or strike shall take place. In the event of a dispute occurring, whether arising in connection with disagreements or otherwise, the matter will be dealt with as provided for in the constitution of the National Joint Council for Civil Air Transport."

"We had reached a point of decision as to whether it was the shop stewards or the board of management who were running the Corporation. Unless we were to abrogate our rights of management of them we had to show that we meant to get what we asked for.

"I can well understand how unwelcome it is for staff and trade unions as well as management to face this fact [redundancy], particularly as the situation has come about through no fault of the men themselves.

"It is not necessarily that any particular individuals or groups of individuals are working inefficiently. It is simply that the traditional British way of looking at this problem of maintenance, which has its roots in the procedures of the last war and no doubt well before that, has been completely outmoded by developments in other parts of the world and particularly in America."

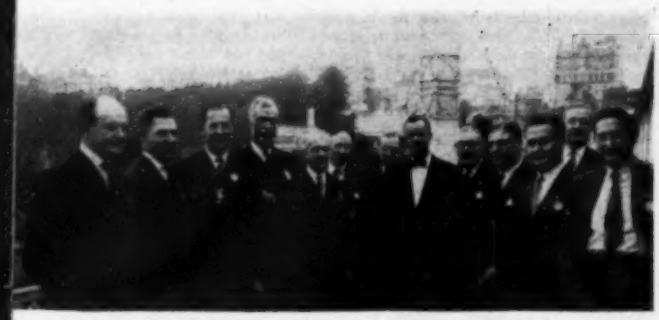
Mr. Smallpeice went on to say that the dispute was the culmination of a trend over six years towards "more and more unauthorized and unconstitutional interference" with normal working. B.E.A. had taken a stand against this trend four years ago in the Peters case. Since then their relations with the staff had been much better. It was now B.O.A.C.'s turn to try and effect a similar improvement. [Jack Peters is the B.E.A. shop steward who was sacked for taking part in a strike meeting during working hours, a meeting which had been banned by the management. After a number of appeals he was re-employed by B.E.A. at Gatwick.] Mr. Smallpeice said that one of the Corporation's greatest difficulties was the trades union attitude to the fact that the Corporation was nationalized. "They appear to regard the two Corporations as having a bottomless purse. And it is perhaps illuminating to note that the trades union will refer to the efforts we make in abusive terms, whereas they will describe as 'generous' and 'acceptable' a similar or even lower offer made by private industry."

Mr. Smallpeice invited the court to make the following findings: (1) That the trade unions sides of the local engineering panels were at fault in imposing a ban on overtime working in B.O.A.C. from midnight on September 20, at Treforest, and in B.E.A. (2) That they were equally at fault in re-imposing these bans. (3) That B.O.A.C. was within its rights in calling for overtime working on the night of October 13. (4) That the strike of hourly-rated engineering staff in B.O.A.C. took place in defiance of the industry's agreements. (5) That, having regard to the complicated issues involved, there had been no undue delay on the part of the employers in dealing with the multifarious wage claims which had confronted them.

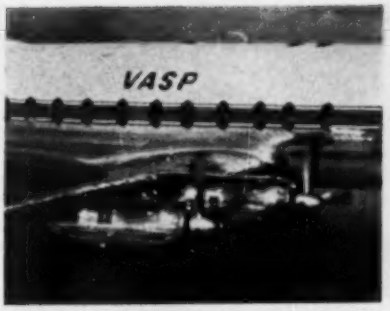
MR. JIM MATTHEWS, recalled and cross-questioned by the Panel about his remark that B.O.A.C.'s management had allowed information about redundancy to reach the Press, said that the *Sunday Express* had carried information that the Corporation was about to declare 3,000 men redundant. No one on the works side had known anything about the engineering committee's report. It had been assumed, therefore, that the information could have come only from someone in possession of the report, and that was the management.

Asked whether it might not have possibly been a bit of journalistic guesswork, Mr. Matthews replied: "No, it was too accurate."

MR. HAROLD SPEAR, of B.O.A.C. denied that the management had given the information to the Press. He said that the *Sunday Express* article appeared in April. On January 21 there had been a meeting at the Airport, attended by union officials, at which the chief engineer spoke about the report. Mr. Spear told the court the report was then made public and people were given copies of it. [Copies were not made available to the Press—Ed.]



Here are some of the delegates who attended the second Guild of Air Traffic Control Officers' Convention at Southend ("Flight," October 31). Their names, from left to right are:— E. S. Willey, B.O.A.C.; A. Cdre. R. T. Gething, Air Staff; W. C. Woodruff, Master of the Guild; Capt. T. W. B. Shaw, R.N.; Capt. V. A. M. Hunt, M.T.C.A.; C. A. M. Kyrke-Smith, Chief A.T.C.O., M.T.C.A.; G/C. A. G. Dudgeon, M.o.S.; W. T. Deason, C.A.A.; E. V. P. Miller, Northern Deputy A.T.C.O., M.T.C.A.; Bernard Collins, Airport Commandant, Southend; L. Vass, Asst. Clerk of the Guild; Mr. B. A. Turner, Master of the London lodge of the Guild; and Mr. G. L. Chambers, Clerk of the Guild



New Viscount 810 markings seen on the right are those of the Brazilian carrier VASP, three of whose five aircraft have now been delivered to Sao Paulo

BRITAIN AND THE CREDIT RACE

IN response to an impassioned plea from Britain's civil aircraft manufacturers, the Board of Trade has given its Export Credits Guarantee Department discretion to extend credit terms on exports of aircraft and engines from five to seven years. Speaking in the Commons on November 4, the President of the Board, Sir David Eccles, described his Government's policy in these terms: "If we found that other countries were providing credit for the export of goods on terms that left our manufacturers at a disadvantage, we should take action. This is now the case in respect of large civil aircraft produced in the United States and financed through the Export-Import Bank." But when pressed by Mr. Frank Beswick to give details of these American credit terms, the President did no more than describe the whole business as "a complex matter" and turned instead to the problems of the cotton industry.

Uncertainty about foreign credit arrangements seems to have become a characteristic of the British aviation industry. It is understood that at the recent conference on Commonwealth airline requirements and problems no representative either of the airlines or of the S.B.A.C. was able or willing to provide any specific details to substantiate claims of unfair foreign competition.

Two events in particular have accounted for this widespread belief in the advantages enjoyed by American manufacturers. The first—and more significant—was the negotiation by the ExIm Bank of a $46m credit to cover Air France's purchase of 17 Boeing 707s. The terms of this contract were an interest rate of 5½ per cent over a repayment period of seven years. But this airliner contract was quite the most unusual into which the Bank had entered. It was the Bank's biggest single commitment (the next highest being a $16.5m. credit in 1956 for four DC-8s for Japan Air Lines); it bore the highest rate of interest (5½ per cent); and it covered the longest period (as far as can be established, no other ExIm loan in this field has extended to cover seven years). At a time when the American Bank rate was below 2 per cent, and the prospect ahead was one of moderate interest rates generally, the negotiation of such a long-term high-rate loan was an example of the ExIm's business acumen rather than of credit give-away.

Although an instrument of U.S. Government policy, the ExIm Bank (unlike the Board of Trade) is charged with running its affairs on a commercially profitable basis, and a glance at its annual reports will show that this object has in fact been achieved. To put the Bank's activities into perspective, their total civil aircraft loans since 1950 amount to about $130m. This represents only between 5 and 10 per cent of the value of U.S. airliner exports over that period. Their typical interest rates have been in the order of 4-5 per cent and the usual repayment period has been five years.

The second event that has led to considerable speculation about American credit terms was the T.E.A.L. decision to buy Electras instead of Comet 4s. At the time this was described as a clear case of unfair credit competition (although the precise terms have not been published); but when Qantas and T.E.A.L. revealed details showing the operating and engineering advantages of sharing a single aircraft type it became apparent that technical considerations were as important as credit arrangements and perhaps more so.

Britain's problem can be described in this way: the last round of jet re-equipment reached its peak in 1956 and has subsequently slackened. This period has been one of high interest rates in the U.K. and low rates in the U.S. That British manufacturers have suffered from this disparity is not so much unfair as unfortunate. Today, for the first time in years, money rates in the two countries have come into line, and if present trends continue British manufacturers should soon be able to command the use of cheaper money than can their American rivals. As soon as the fare-differential question is settled it is likely that further orders will be placed for turboprops or turbojets. Unless the Board of Trade's action triggers-off a credit race, Britain's aircraft industry should be better placed financially than it has been for many years.

BREVITIES

B.E.A. have revealed their plans for reducing inclusive-tour fares on mid-week night services. Neither Government nor I.A.T.A. approval has yet been obtained for these reductions.

* * *

Britain and Italy have successfully concluded negotiations for a new bilateral air traffic agreement.

* * *

The twenty-eighth annual general meeting of the Guild of Air Pilots and Air Navigators will be held on November 20.

* * *

Air India are due to start a once-weekly all-freight service between London and Bombay from tomorrow, November 15. A DC-4 on charter from Seaboard and Western will be used.

* * *

C.S.A.'s fleet of 18 DC-3s, due to be replaced by Il-14s and Il-18s, are reported to have been purchased by a British company, Barry Engineering Service.

* * *

The Italian cabinet has approved the allocation of L.4,000m (£2.3m) for the completion of Fiumicino Airport. Rome's new international airport is expected to be ready for use in 1960.

* * *

America's six leading airlines have agreed a plan to share revenues in the event of strike action. As the engineers' union has now called off the Eastern stoppage, only Capital is at present grounded.

Arkia have ordered three Nord Noratlas for use on internal routes within Israel.

* * *

El Al have resumed their Tel Aviv - Johannesburg service, using a DC-6B chartered from Sabena.

* * *

Cuban rebels last week seized a Cubana DC-3. The airline has now lost three aircraft through rebel action.

* *

Channel Airways inaugurated a daily service between Southend and Antwerp on November 3.

* * *

Passenger traffic at British airports in August was 3.5 per cent higher than in August 1957. This rate of monthly increase was the highest recorded this year.

* * *

PanAm have notified the C.A.B. of their approval in principle to Qantas' application to carry international traffic on sectors within the U.S.

* * *

More-up-to-date information should be added to the M.T.C.A. runway data quoted in *Flight* "Airport Facts and Figures" last week. Manchester: L.C.N. 65 and an 1,100ft extension for unrestricted use next spring. Prestwick: L.C.N. "about 80" (concrete surface), and work approved for an unannounced extension.

Next year's models of the Piper Apache and the single-engined Comanche 250. The 1959 Apache features increased sound-proofing and revised instrument panel; and the Comanche has a new design of rudder, laminar-flow wing and "single-piece stabilator"

Club and Gliding News

AN M.T.C.A. proposal to abolish the petrol-tax rebate to flying clubs would make flying a rich man's sport with only small financial benefit to the Government, Mr. Geoffrey de Freitas, M.P., said in London last Friday. Mr. de Freitas, a vice-president of the Association of British Aero Clubs and Centres, was speaking at the Association's annual dinner at the Waldorf Hotel. Abolition of the tax rebate would produce at most £32,000 per year, he said: the Ministry should work towards ensuring more, not fewer, private pilots. Further criticism of the Ministry that evening came from Mr. G. H. M. Miles, chairman of the A.B.A.C., who complained that a less-helpful attitude had been shown during the last two years by M.T.C.A. officials than had previously been the case.

Deputizing for Mr. Airey Neave, M.P., who was to have deputized for the Minister of Transport and Civil Aviation at the dinner, Sir Gilmour Jenkins, Permanent Secretary to the Ministry, said that this was exactly the occasion which needed the Minister himself to deal with these points. Sir Gilmour went on to bat tactfully and as well as possible on his admittedly sticky wicket. There was no lack of enthusiasm in the Ministry for the flying-club cause, he said; the clubs were up against the financial facts of life rather than opposition from anyone.

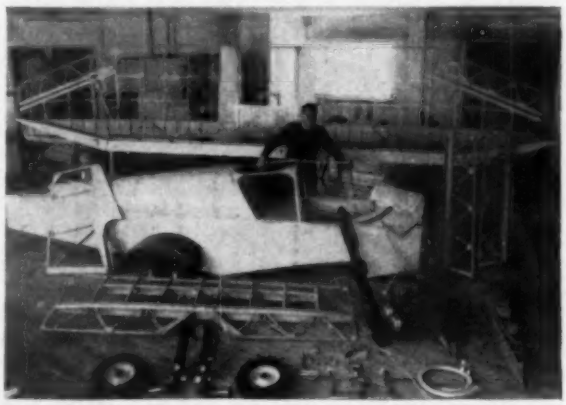
The value of the flying clubs in stimulating R.A.F. recruitment through the Flying Scholarship scheme was referred to at the dinner in a speech by the Secretary of State for Air, Mr. George Ward, M.P. As usual on this occasion there was a contribution from l'Abbé Amiard, representing the French clubs: this year he described the arrival at Alençon of a Jodel four-seater out of which stepped its constructor, his wife, and their five children. Seven people in a four-seater, the Abbé mused: "I think it is progress!" The dinner ended with the presentation of the Lennox-Boyd Trophy for the most efficient club or centre, to Jim Denyer on behalf of the Newcastle Air Centre. Close runners-up to Newcastle, Mr. Miles revealed, had been Southend and Elstree.

THE lecture room of the Kronfeld Club was transformed into a miniature art gallery last week on the occasion of the club's first exhibition of aviation paintings and drawings. No fewer than 44 pictures were on view, of which 14 were by professional artists, including several which had been shown at the recent exhibition of the Society of Aviation Artists. One of these, the magnificent *Sopwith Camels* by Roy Nockolds, took justifiable pride of place on the professionals' wall. Other vintage aircraft portrayed included Gamecock (P. E. Norman), S.E.5 (G. Watson) and two of Leonard Bridgman's *Flight* series, the Camel and D.H.9A.

For Kronfeld club members, however, their own sport implied an interest in light aviation rather than the belligerent aircraft of two world wars, and it was not surprising that gliding subjects accounted for 75 per cent of the exhibits. Among the sailplanes were several by Ann Welch, of which *Skylark 3 No. 66*, *Fanny at Lasham* and *End of a Cross-Country* were particularly pleasing. *Skylark*, by M. G. Rowley, made a strong impact, as (in different style) did the two *Abstracts from 2,000ft*, by A. F. Walker. This season's light powered flying was represented by G. M. Turner's *Tiger Club, Goodwood*, with three Tiger Moths in tied-together formation over the racetrack airstrip, and *Druine Turbulent* by J. Young. A varied talent was displayed by 14-year-old Nicholas Price, who offered a view of Dunstable, his impression of *Old Flying Days* and a pencil copy of a Fairey Rotodyne cutaway.

Winners of the competition in the amateur section of the exhibition were (1) *Skylark 3 No. 66* by Ann Welch, (2) *Dunstable Downs* by Nicholas Price, and (3) *Tutor at Camphill* by S. W. Hickson. The judges, Cuthbert Orde and Lee Kenyon, reported that the first prize-winning picture was "the result of most accurate observation," the second was "a praiseworthy attempt to see the subject as a pictorial pattern," and the third was "a brave effort to present the subject in an imaginative way."

On Friday, November 7, at the Eccleston Hotel, the club held its first annual dinner and dance. The need for all light-aviation groups to work together was a dominant theme in several of the evening's speeches. David Carrow, deputizing for Maurice Imray, proposed the health of the guests, and the chairman of the Royal Aero Club, Col. C. F. H. Gough, replied. A toast to the Kronfeld Club was proposed by Lord Sempill and replied to by Hugo Trotter, the club secretary. Strong support from members of gliding clubs had been received at the Kronfeld, Mr. Trotter reported, and the need was now to build up the power-flying membership.



Amateur constructors' kit for the Aero-Jodel D.11A Club (65 h.p. Continental), approximately 50 of which have been built or are under construction in Western Germany

RECENTLY test-flown by Aero-Flugzeugbau Hubert Zuerl, Heimstetten, near Munich, is a 90 h.p. Continental-powered version of the company's Aero-Jodel D.11 Club two-seater. The original model is the D.11A, powered by a 65 h.p. Continental, and the new type, designated D.11C, has an increased gross weight of 1,435 lb. With two persons and full tanks, this leaves 245 lb available for baggage. The D.11A has received its official type certificate from the German Federal Aviation Board for both amateur and commercial construction.

LAGOS Flying Club has just completed the first five months of its existence. Formed by a few enthusiasts, the club now has 106 members and has recently begun operations with a Tiger Moth. Before the aircraft was purchased a course of lectures on P.P.L. subjects was held, and there are now about 20 Nigerian and European members ready to take the written tests as soon as their flying is complete. At present club members have to fly 60 miles into the French territory of Dahomey in order to obtain the services of a qualified instructor, but it is hoped that government help may be received in overcoming this problem.

Entrants for the recent fourth international Alpine rally at Innsbruck included seven aircraft from this country, of which two, Gemini G-AKHK and Percival Q.6 G-AEYE are seen in this line-up

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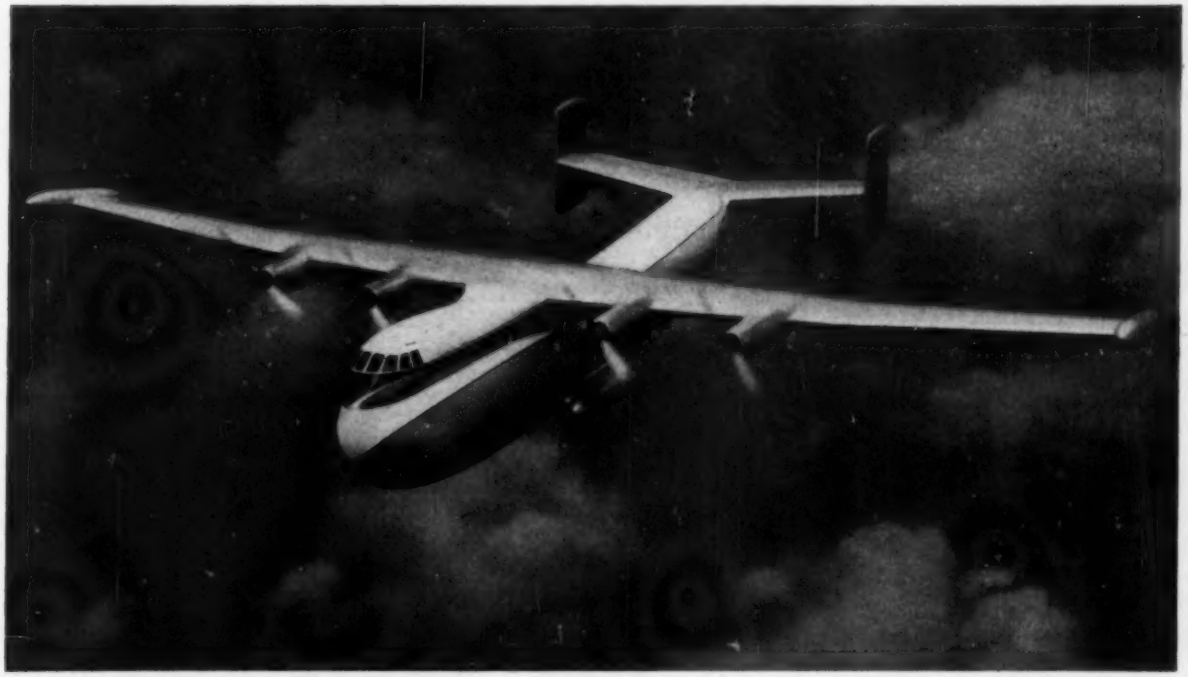

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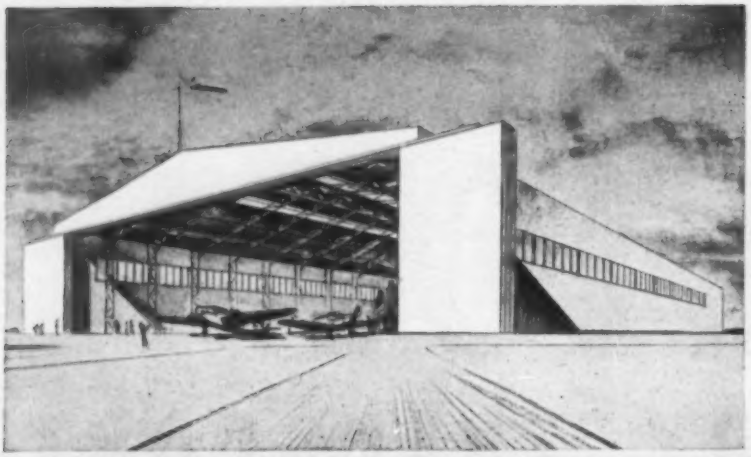

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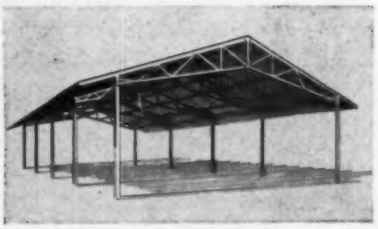

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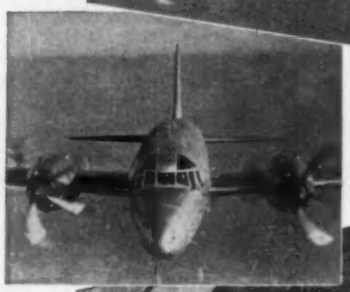

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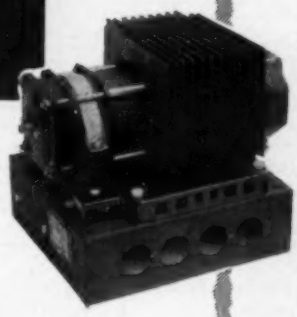
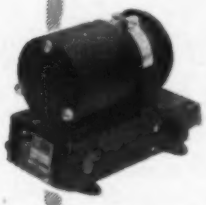


Automatic voltage regulator Type 50/51858 used in conjunction with the B.T.H. generators on the Comet 4.



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PUBLIC ANNOUNCEMENTS

AIR TRANSPORT ADVISORY COUNCIL

THE AIR TRANSPORT ADVISORY COUNCIL give notice that they have received the undermentioned applications to operate scheduled air services:—

FROM Derby Aviation, Ltd., of Derby Airport, Burnaston, near Derby:—

APPLICATION No. 2324 for a Normal Scheduled Service initially with Dakota aircraft and later also with Herald aircraft for the carriage of passengers, supplementary freight and mail on the route Manchester and/or Derby and/or Birmingham - Lyons (tech) - Albenga (tech) - Genoa (Christopher Columbus) at an initial frequency of two return flights weekly increasing later to four return flights weekly for seven years from 1st May, 1959.

APPLICATION No. 658/4 for an amendment to the terms of approval of the U.K. Internal Services which they are authorized to operate on the route Birmingham (Elmdon) (opt.) - Derby - Nottingham (Tollerton) (opt.) - Carlisle (Crosby) (opt.) - Edinburgh (Turnhouse) (opt.) - Glasgow (Renfrew) with Dakota and Marathon aircraft at a frequency of one return flight daily until 21st February, 1963, so as to extend the route to Luton with an optional traffic stop at Northampton (Sywell).

FROM Eagle Airways, Ltd., of 40 Edgware Road, London, W.2:—

APPLICATION No. 2333 for a Normal Scheduled Service with Viking, Viscount and DC-6A/B aircraft for the carriage of passengers, supplementary freight and mail on the route London Airport and/or London (Blackbushe) - Lyons (opt. tech) - Genoa (Christopher Columbus) at an initial frequency of four return flights weekly increasing later to seven return flights weekly for ten years from the opening date of Christopher Columbus Airport.

THESE applications will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on 30th July, 1952. Any representations or objections with regard to these applications must be made in writing stating the reasons and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 3 Dean's Yard, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, should reach them within the period allowed for the making of representations or objections. [8485

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AIR TRANSPORT ADVISORY COUNCIL

THE AIR TRANSPORT ADVISORY COUNCIL give notice that they have received the undermentioned application to operate a scheduled air service:—

FROM Eagle Airways (Bermuda), Ltd., of Radio Centre, Hamilton, Bermuda, for a Normal Scheduled Service with DC-6A/B and Britannia aircraft for the carriage of passengers, supplementary freight and mail between Bermuda and London with intermediate technical stops at Gander and/or Shannon or Azores and/or Lisbon at an initial frequency of three return flights weekly increasing later to seven return flights weekly for ten years from date of approval.

THIS application will be considered by the Council under special Terms of Reference contained in a letter to them from the Minister of Transport and Civil Aviation dated 28th October, 1958. Any representations or objections with regard to this application must be made in writing stating the reasons and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 3 Dean's Yard, London, S.W.1, from whom further details of the application and copies of the Minister's letter may be obtained. [8484

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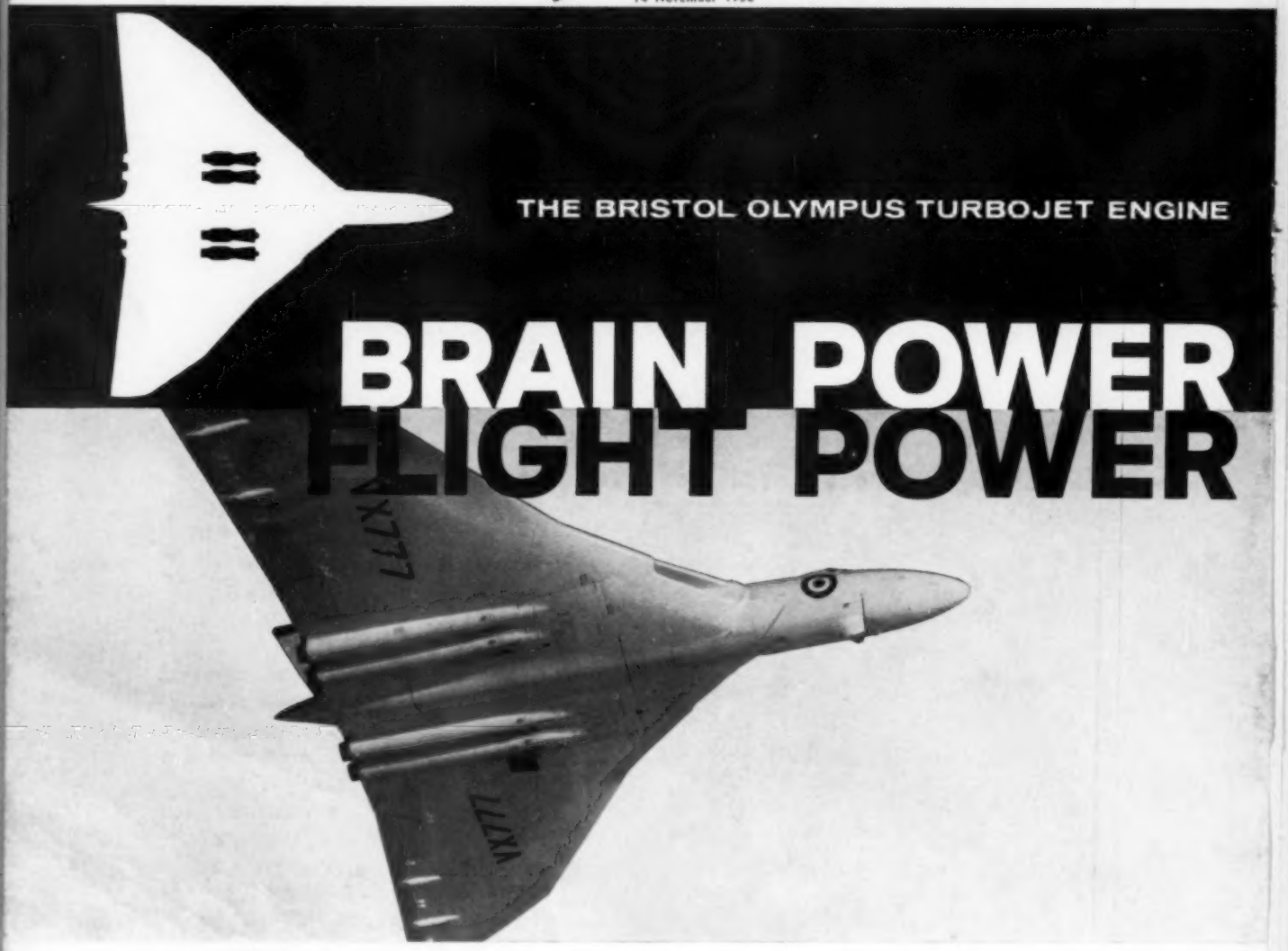

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